





National Picture Magazine.

Nineteen Ninety Five Paint Questions Answered

*A Sequel to "1,000 More Paint
Questions Answered."*

A Reference Encyclopedia Answering Knotty Problems that are
met daily by Painters, Decorators and Paint and
Varnish Manufacturers.

Arranged Under Topical Heads for Ready Reference, with
Complete Index, so that desired information
may be readily found.

PRICE, \$6.00

PUBLISHED BY
THE PAINTERS MAGAZINE
100 WILLIAM STREET, NEW YORK

THE TRADE PAPERS PUBLISHING CO., Ltd.
LONDON, W. C. ENGLAND

TP936
.N32

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by
The Painters Magazine

JAN 21 1920

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Preface

FOR MANY YEARS THE PAINTERS MAGAZINE has published a department on Questions Answered, being replies to questions on painting and decorating problems sent to the Magazine by its readers. This has proved one of the most important and valuable of the Magazine's departments, and the answers to questions have been the means of aiding immeasurably the practical painter and decorator, as well as the paint and varnish manufacturer, in the conduct of their business.

Several years ago we deemed it opportune to compile these answers and publish them in book form. We did so, calling the book "739 Paint Questions Answered." Later, the edition becoming exhausted, we published a larger volume under the title of "One Thousand More Paint Questions Answered." This met with a large sale, and the book was accepted as an encyclopedia of the painting and decorating trade.

"One Thousand More Paint Questions Answered" was published in 1909. Since that time the demand has taken the entire supply, and as there was still an insistent demand for the book, it was felt that a new edition, rewritten in part, with obsolete questions eliminated, and others brought down to date, would be welcomed by the trade.

"Nineteen Ninety-Five Paint Questions Answered," while containing many of the replies to questions that were published previously, comprises, in addition, all of the important questions which have been published in the Magazine during the years 1909 and 1919. There was a vast number of these questions, and in compiling this book the publishers have gone over the questions thoroughly, have rewritten those which it was felt should be rewritten, culled out those which had lost their force by reason of a change in time and methods, and have produced a thoroughly new book. There is hardly a phase of the painting and decorating business which is not covered in this new book. The answers are practical, and are in reply to problems which have actually come up to painters, decorators and paint and varnish manufacturers in the pursuit of their business. While the answers are in many cases semi-technical, they are nearly all of a nature readily understandable by the average painter and decorator. They are the product of the best opinion of experts who have made a life study of painting and varnishing, and while painting and decorating is not an exact science, and constant changes are being rung in methods, it is believed that this book is the last and best word in the problems of the craft up to this time.

In addition to the replies to questions, the publishers have added two new chapters on Automobile Painting and on Railway Equipment Painting, which are reprinted from articles appearing in the Magazine, and are the product of the pen of M. C. Hillick, probably the best informed writer on these subjects in America. These chapters are in addition to the direct replies to questions on these subjects which appeared from time to time in the Magazine.

One of the features of the second book was the methods and formulas given by "The Veteran Painter" which appeared in conversational form in the Magazine. These have been reprinted in this new book. The practical hints on wall papering and decorating, by Robert N. Hunter, a recognized authority, have also been incorporated in this volume.

Many replies carry the name of H. C. Standage. Mr. Standage, who has since died, was one of the foremost chemists in England, and his replies have the stamp of authority for practices in England.

The opening chapter on Pigments and Vehicles; Their Characteristics and Uses, has been entirely rewritten by an expert, and covers the entire field of pigments and vehicles as they are now known to the paint trade. This chapter alone is of inestimable value as affording an elementary article on the entire subject of painting and paint and varnish making.

In some of the articles the question of prices is touched upon. Where possible these prices were brought down to date, but where they were inseparably attached to the main article, and it was found impossible to eliminate them, they have been allowed to remain, and the reader should take into account that the advancing level of values in the past few years has altered the quotations therein contained.

The publishers confidently expect that this book will be accepted by the trade in the same spirit that the two previous books were. They take this occasion to thank the trade for the kindly words of commendation which greeted the two previous efforts, and they hope that "Nineteen Ninety-Five Paint Questions Answered" will meet with universal approval.

THE PAINTERS MAGAZINE.

New York; December, 1919.

1995 PAINT QUESTIONS. ANSWERED

PIGMENTS AND VEHICLES; CHARACTERIS- TICS, USES AND TESTS.

WHITE PAINT PIGMENTS.

—1—

Basic Lead Carbonate—White Lead.

This pigment, no matter by what method or process it is produced, is corroded metallic lead and, so long as it contains the proper percentages of lead hydrate and lead carbonate, is an amorphous white powder, that has quite an affinity for linseed oil, and forms, when so mixed, an indispensable paint material of decided hiding power and elasticity that cannot be replaced for many purposes by any other white pigment.

What we know as Old Dutch Process white lead is made by the stack method and is considered the most opaque material, constituting 60 per cent. of the total produced, while that made by the chamber method is about 20 per cent.; the balance of 20 per cent. is being produced by various quick or so-called mild processes. The chamber method white lead is also of very good hiding power, while quick or mild process lead is more or less lacking in opacity, due to its greater whiteness, lighter specific gravity and greater oil absorption.

The practical consumer will test white lead for its purity of tone, its fineness and its opacity or covering power. First-class white lead must not, when thinned, after being ground stiff in oil, with spirits of turpentine and spread with a suitable brush on a strip of glass, show a yellow, gray or pink cast. If yellow, it may have been overheated in the mill, causing less opacity; if gray, it shows presence of uncorroded metallic lead; if pinkish, it shows the presence of oxide of lead—red lead.

It must also dry flat or nearly flat, when so tested, and show a smooth surface in order to demonstrate its fineness. The tinctorial strength of white lead is no criterion for its opacity or covering power. In comparing two or more brands of white lead the best method is to weigh out like portions of each, thinning these with like portions of thinner, then spreading the resulting paint over a flat black surface, and observing the obscuring or hiding power of each.

White lead is miscible with all pigments that do not contain sulphur, but it must not be tinted or mixed with sulphides, such as cadmium, King's yellow, ultramarine blue or green, because in that case the black sulphide of lead will be formed, sooner or later causing discoloration. That white lead paint becomes discolored when exposed to sulphur gases is so well known that the fact need hardly be mentioned.

The name of the corroder on a package of pure white lead is sufficient guarantee of its purity.

—2—

Basic Lead Sulphate—Sublimed White Lead.

Sublimed white lead, as the name indicates, is made by the sublimation process from galena ore found in Missouri and Illinois, the ore containing certain percentages of zinc that cannot be entirely eliminated in the process, although in the course of the last fifteen or twenty years the percentage of zinc oxide has been reduced from 16 per cent. to 5 or 6 per cent. It has also become more amorphous and less harsh in texture and of a clearer whiteness than it had been years ago. Not only that, but it shows up with as great or at least nearly as great hiding power as the better brands of corroded white lead. The disadvantage in substituting sublimed lead for the latter is in its lesser elasticity, and in preparing primings, where elasticity is required, it should not be made use of. Its chief virtue, however, lies in the fact that when used in localities exposed to sulphur gases it will not tend to blacken like corroded lead, nor is it apt to chalk like the latter on exposure, though it is liable to scaling and alligatoring, unless well tempered with a moderate percentage of paris white (chalk) and the proper amount of well settled pure linseed oil.

Sublimed blue lead has been used with good success in the painting of metal surfaces. This pigment has great hiding power, but outside of its use on iron and steel surfaces, there is not enough known as to its wear to embody the information here.

—3—

American Zinc Lead and Leaded Zincs.

Some twenty-five years ago a pigment was placed on the market under the name of zinc lead, which was made from horn blende or galena ore in Colorado, and at first contained 28 per cent. lead sulphate and 72 per cent. zinc oxide, which composition changed later to 48 per cent. lead sulphate and 52 per cent. zinc oxide. It was produced by the sublimation process, similar to that used for making sublimed white lead. These pigments were used by paint makers for cheap tinted pastes, but never took well, because of the great harshness and inferior color, and gradually went out of the market, because of improvements being effected in the production of the pigment now known to the trade as leaded zinc. This pigment runs quite uniform in its constituents of 35 per cent. lead sulphate and 65 per cent. zinc oxide, and the tests made on the various test fences in different parts of the country appear to have proved it as one of the best single white pigments, as reported by the Committee of the American Society for Testing Materials in 1914. The only objection is that it is not as white as a white lead and American zinc mixture, yet for bases for tints it will answer very well. So far, there is no indication that this pigment has been placed on the market ground in oil in paste form, but there is no question of its being employed largely in ready mixed tinted paints, the high percentage of oil required not being detrimental in its use.

—4—

Zinc Whites (Oxide).

There are two methods or processes of making zinc whites known to the trade—the French and the American process. In the first method the white is prepared from spelter, the refined zinc metal, in the second it is prepared from the ore direct. The French process produces the whiter and finer pigment, while that made by the American process is not so pure a white and somewhat harsher in texture. For the work of the artist and the interior decorator the French process zinc white (also known as Chinese white) is preferable, also in the manufacture of high-grade enamel paints, while for exterior work the American process zinc white is fully satisfactory. A portion of, say, one-fourth of the total zinc

white added to white lead paint will correct the tendency of the latter to chalk, and for painting at the seashore or salt water atmosphere it may be increased to one-third, but the first or priming coat should in all cases be pure white lead and raw linseed oil. Certain brands of Western zinc oxide contain a small portion, between 4 and 6 per cent. of lead sulphate, which, however, is not detrimental in exterior or ordinary interior painting. In testing zinc whites the practical man will value those brands highest that show the cleanest and purest white, that are finest in point of smoothness of grinding and show the greatest resistance to color, when tinted with black.

—5—

Lithopone or Zinc Sulphide White.

Lithopone white is a white powder resembling zinc white at first glance, but is of heavier specific gravity, and in consequence not as great an oil absorbent. Various grades are sold under such brands as green, blue, red, white, even yellow seal. The best brand is usually that designated as green seal, which consists of about 30 per cent. zinc sulphide, 2 per cent. zinc oxide and 68 per cent. barium sulphate (barytes). The other brands run from 26 per cent. zinc sulphide down to as low as 12 or 14 per cent. A very simple test will tell whether the pigment is zinc oxide or lithopone. A little dilute hydrochloric or sulphuric acid dropped upon lithopone will emit the odor of sulphuretted hydrogen, while the pigment effervesces; zinc oxide, on the other hand, remains unaffected. As a pigment, lithopone shows great covering and spreading power, and finds a ready market in many industries, such as oil cloth and shade cloth making, and gradually works its way into the manufacture of paints for interiors, but it has, up to the present, one great drawback, that of discoloring, when used as a pure white, under exterior exposure. Otherwise, it is a very stable pigment, unaffected by sulphur and other noxious gases. Cannot be mixed with white lead, because of the tendency to form the black lead sulphide.

—6—

Barytes (Barium Sulphate).

Of all the materials used as extenders in paint and color making, barytes (or heavy spar) is the most important one. Those who in times past condemned its use have been misunderstood. It was well known how great a necessity the material was, and the condemnation was not directed against its use, but against its abuse or misuse. The fight was for honest labeling and against calling a color containing 80 per cent. barytes pure color.

Whenever a color made by chemical process, such as, for instance, the so-called chrome greens, is used for painting exterior surfaces, it is folly to use it chemically pure, because, in the first place, it is not economical, being too high in first cost, and it will not wear as well as a green consisting of 25 per cent. well made chrome green and 75 per cent. natural barytes of good fineness. Or what would be the use of applying to a surface, exterior or interior, a chemically pure para red? It would be a mere stain, unless precipitated on a certain portion of natural or artificial barytes (blanc fixe). Barytes in either form is a perfectly legitimate pigment, so long as it does not parade under another name. Barytes is a perfectly safe inert pigment of little hiding power and should be tested for color and fineness by the practical paint maker and for impurities such as clay, lime and silica by the chemist.

Blanc fixe or precipitated barytes is produced by adding sulphuric acid to a salt of barium and absorbs double, sometimes treble, the quantity of oil, taken up by natural barytes. It is very buoyant, as compared with the latter and is used more as a mordant in color making, etc., not to a great extent in paint making.

It is questionable whether it pays the paint or color maker to use any but water floated ground barytes, when it is considered that second grade in point of fineness, although lower in price, will increase cost of grinding the material it is associated with through wear and tear of mill stones and time consumed; nor is it good practice to use off-color barytes, for the reason that, not only an excessive portion of oil is required, because of its lighter gravity, due to its association with clay, etc., but also to its dulling the tone of color with which it is mixed.

—7—

Paris White or Whiting.

Paris white (chalk) or calcium carbonate, is another important factor in paint and putty making, the best being that ground in water from the chalk of the English cliffs on the Channel and in the north of France. Without it good putty cannot be made, all other materials, such as marble dust, which is also calcium carbonate, clay, etc., being too short and brittle. As a suspender in paint it has hardly an equal. In the manufacture of chinaware, picture moldings, in relief decoration and for preparing kalsomine and in fresco work it is an absolute necessity. In colors the presence of whiting can readily be determined by the addition of hydrochloric acid, as it will be found to effervesce. It is not safe to use with Prussian or Chinese blue, which it turns greenish, nor with chrome yellow or chrome green, to which it imparts a rusty cast and should be omitted from all colors that are readily affected by alkalies. Whiting usually contains more or less of the alkaline properties, but will not effect earth or mineral colors, such as ochers, oxide of iron reds, lampblack or bone black or lime-proof ultramarines.

Since there is so much difficulty of obtaining sufficient supplies of chalk from abroad, quite a number of by-products from many industries are offered to the trade as calcium carbonate or carbonate of lime, and while the materials are really fine and white, they are undesirable in the manufacture of putty, because of their extraordinary absorption of oil and their bulkiness, while as an extender for paint, when free from alkali, they may be used to advantage, when quoted low enough in price.

—8—

Terra Alba or Mineral White.

Terra alba or gypsum, the sulphate of calcium, is another very important pigment for paint. It occurs in rock form in nature and this is the best for use in paint making, the by-products of certain chemical works being unsafe. It is placed on the market in fine white powder, that has good hiding power, when mixed with water, but is rather translucent when ground in oil. It contains in its natural form 79 per cent. of solid matter and 21 per cent. of water of crystallization, and in that state it is used for mixing with paint, principally with oxide of iron, sold as Venetian red. When heated to a temperature of 300 degrees F. it loses its combined water in part and in that state is able to take up water and sets in a hard mass. It is then known as calcined plaster, or plaster of paris, and used for many well-known purposes. Gypsum is tested for fineness of grinding and absence of color, the whiter it is the greater its value. It is perfectly inert and can be used safely with any pigment in paint making.

In research it has been determined that some mechanical mixtures of red oxide of iron with hydrated sulphate of lime (gypsum) under certain conditions have proved a Venetian red of this character to be undesirable, because of the tendency of the gypsum to be soluble in water, the paint washing off from the surface subjected to continuous contact with moisture. However, when the Venetian red is made by calcination, at high temperature, this feature is obviated.

—9—

China Clay (Kaolin).

China clay or kaolin is hydrated silicate of alumina, containing usually about 12 per cent. combined water, with traces of iron oxide, potash and lime. The material, when of good fineness, has a soft, unctuous feel, and when well washed there may be a roughness apparently, but seldom any grit present. It is a perfectly safe material in paint, but is not used to any great extent, while its chief uses are in pottery, calico finishing, paper making and in the manufacture of ultramarine. The best quality is imported from England, it being far superior to the majority of the brands mined in the United States.

As an extender for colors, like Chinese or Prussian blue, that are affected by the presence of alkali in whiting, the distemper material can be made safely with china clay in place of the former.

—10—

Silica or Silex.

This material is the quartz in its purest form, known as the oxide of silicon. It is in the form of fine sand and found in many parts of the United States, showing a spherical texture, while in other parts it shows a prismatic form under the microscope. The latter form is considered best for its use as a mineral wood filler, while the other is preferable in paint. Silica or silex is unaffected by any other pigment, perfectly inert, therefore a safe extender for paint, but aside from use in floor paints and similar uses is not to be recommended in paints, as it is at best a rather brittle material. None but the finest floated silica or silex should be used in paint making, as well as in the making of fillers, and the material should be tested for this characteristic, as well as the absence of discoloration by oxide of iron.

—11—

Magnesium Silicate (Asbestine).

This material, although known for many years under various fancy names, has sprung into prominence of late, because of the publication of certain paint formulas by chemists in charge of experimental stations in States where paint laws have been enacted. No matter what may be claimed about its fibrous texture and consequent strengthening of the paint coating, for which the term "reinforcing" pigment has been invented, its original introduction into paint was due mainly to its great oil absorbing and suspending properties. It has pretty much the same fault as whiting, that of being slightly alkaline. Its texture being somewhat fibrous, it must be ground very fine, otherwise it will impart too much "tooth" to the paint and make the paint or color appear coarse even when the other portions are ground very fine.

There are several varieties of this material, some bulkier than others and more oil absorbent, but not differing very much in composition. Soapstone or talcose belong to this group, but are not fibrous like asbestine.

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BLACK PAINT PIGMENTS.

—12—

Lampblack.

True lampblack is produced by the combustion of oils and is of great density, very bulky, and when used to produce grays with white lead or zinc white,

gives a clear bluish gray tint. The practical consumer determines the value of lampblack by its tinctorial strength and its tone, fineness and capacity of drying. Lampblacks that contain unburnt oil (empyreumatic matter) are deficient in that respect. Whether such matter is present in dry lampblack can be determined by placing a small hillock of the black on white blotting paper, then wetting the black with sulphuric ether, placing a small tumbler of glass inverted over the hillock, preventing rapid evaporation. If the circle around the hillock of black made by the absorption of ether remains clear, the black is free of unburnt oil, but if there is a yellow "halo" or ring around the hillock, empyreumatic matter is present, which makes the black dry poorly and makes it unsafe to keep about a shop or factory, being liable to spontaneous combustion, a fire risk.

So-called lampblacks have been made from rosin and all kinds of refuse, but these materials are neither safe in paint nor are they economical even at low selling prices, and a high grade of oil lampblack extended with inert material is better by far in the long run. The practical paint maker will discover this by trial in grinding.

—13—

Carbon Black.

As placed upon the market today, sometimes under the name of lampblack or as velvet black, is the hydro gas carbon black produced by the combustion of natural gas, the soot which is collected on the inside of revolving hoods or cylinders, from which it is removed by steel scrapers, which accounts for the small portion of iron found in some of these blacks. These blacks, although denser in tone than lampblacks, are not as amorphous, more crystalline in texture, require more oil for grinding into paste form and do not dry as well as the better class of oil lampblacks. Nor do they produce as clear a tint with white. For sign writing, especially as a base for smalting, they are excellent; also for iron work painting, for freight and coal cars, when extended with good inert pigments and thinned with good linseed oil and drier, and in this work they are preferable to ordinary lampblack. There are other kinds of carbon black, such as charcoal made from willow tree, which is the finest of its kind, and the charcoal made from the refuse of wood pulp and vine black made from the twigs of grape vines and hop vines. But their texture being rather fibrous, they are not much in favor with paint makers and painters.

—14—

Bone and Ivory Blacks.

Drop black, as we know it, is produced by charring animal bones and grinding the resulting product to fine powder. The name drop black is derived from the form in which these blacks were sold in years gone by. The black was pulped in water and so ground, then formed into drops and dried. This is a thing of the past, but the name still clings to the powdered bone or ivory bone black. Drop black is made from ordinary bones, as a rule, but many brands contain in addition all sorts of animal refuse, which imparts to them greater tinctorial strength, because the percentage of carbon is increased.

Ivory black is supposed to be calcined ivory chips, but this idea is exploded long since, and while the so-called genuine or real ivory black may contain the refuse of ivory turners' benches, or chips, the bulk of it consists of selected shin bones and knuckles of oxen, and its superiority is simply due to the care employed in calcination, grinding and drying. The practical consumer, paint maker or painter determines the value of bone and ivory blacks by density of color, fineness and lustre of tone, taking strength also into consideration. The spent bone blacks (sugar-house blacks), so-called because the freshly calcined black has been used in sugar refining, should not be used in paint manufacture, there being great risk, inasmuch as the spent black carries with it more or less vegetable matter, which has not been eliminated in washing. Ivory black is usually

stronger than bone black, but animal black is often twice, even three times, as strong as either. On the other hand, these blacks are rather weak, as compared with lamp or carbon black.

—15—

Miscellaneous Blacks.

Frankfort black and vine blacks are almost similar, as they are the result of calcination of all sorts of refuse, animal as well as vegetable. Bones, hoofs, twigs, vines, even peach or plum stones, are calcined together, and when animal matter predominates, the black is classed as Frankfort black, otherwise as vine black.

Candle black is made by holding a cold plate of chinaware over the flame of a lighted candle, scraping off the soot.

Manganese black is simply the black oxide of manganese. Can be used as a paint material, but on account of its rapid drying properties does not find much favor.

Mineral black and black filler are very useful in the manufacture of paints and surfacers or fillers for machinery. They consist essentially of the silicates of alumina and silica, together with varying percentages of carbon and oxide of iron. Strengthened with carbon black, they make a very durable black paint, and several branches of the government service specify the following for the composition of black paint:—Natural mineral black, with the addition of 15 per cent. carbon black and 5 per cent. finest dry red lead, to be ground into paste form with pure linseed oil, well settled by age.

All the blacks described, with the exception of the most inferior lampblacks or so-called sugarhouse bone blacks, are perfectly safe pigments alone or in admixture with all other pigments in water, oil or varnish. Oil lampblacks, however, are difficult to mix with water, and for distemper work drop black is generally used.

A quick test for determining whether a dry black in powder is lampblack or gas carbon black is to fill as many beakers or tumblers as there are samples with clear water and sprinkle a pinch of the blacks on the top of the water. If the black precipitates fairly rapidly to the bottom of the beaker or tumbler it is sure to be gas carbon black, as oil lampblack does not mix as well with water.

Graphite, sometimes misnamed black lead or plumbago, derives its covering power from the presence of carbon in its composition; in fact, it is, when fairly pure, a carbon. Graphite to be useful as a paint material must not be of a flaky nature, but in the nature of an amorphous powder, and should not contain less than 60 per cent. of carbon, the remainder to be gangue of silicious nature. The practical man will test it for fineness, strength and oil absorption; the chemist will look into its general composition.

BLUE PAINT PIGMENTS.

—16—

Ultramarine.

No one at the present day in looking for a blue pigment will look for natural ultramarine, the lapis lazuli, but will take for granted that an inquirer means the artificial product. Ultramarine blue is a very important color in painting and is distinguishable from all other blue pigments by its pure though pale tone and by the fine tints it produces with zinc white. It cannot be mixed safely with white lead or any other lead or copper compounds (on account of its containing sulphur), these being liable to become discolored through the formation of black

sulphides. With all other pigments, ultramarine blue is miscible and perfectly safe. In pure air ultramarine blue is very permanent, but is rapidly decomposed from contact with acid vapors. There are two kinds of ultramarine blue, the sulphate ultramarine, which is rather light in shade with a greenish blue tone, and the soda ultramarine blue, which is usually darker in shade with a violet blue tone. The latter is least changed by atmospheric and other conditions. Ultramarine blues should be tested for richness of tone, fine grinding and tinctorial strength. There are other ultramarines, such as red, brown, violet and purple, but, as they are uninteresting, we will pass them by.

—17—

Cobalt Blue.

Cobalt blue, a compound of the oxides of alumina and cobalt, is very rarely found except in artists' color tubes. What we usually obtain is imitation of cobalt blue, a sulphate ultramarine blue of the cobalt blue characteristic. What was said of the ultramarine blue applies to this also. True cobalt works better in water than in oil, and for this reason it is favored by artists. In every other respect it is a better blue than ultramarine, as it may be mixed with any other pigment without the risk of either being affected. To distinguish it from sulphate ultramarine treat it with acids, which will not alter true cobalt unless strongly heated. Use the usual test for tone, fineness of grinding and tinting strength to determine the value of one brand as against the other.

—18—

Chinese Blue—Prussian Blue.

Chinese blue is really of similar composition as Prussian or Berlin blue, but of better selection. When sold as Paris blue, Chinese blue that has the bronze fracture is selected. The composition in its best form is ferrocyanide of potash, but of late, owing to the scarcity and high cost of potash, ferrocyanide of soda has been substituted. By slight changes in the process the shade can be made either of the greenish tone or a violet tone, the former producing a fine sky blue tint with white, the latter a lavender tint. The Prussian blue sold as Chinese or Paris blue, therefore, is the best for tinting white, while the Prussian blue of the violet tone is best adapted for mixing composite greens, especially for grinding in japan or varnish for vehicle painting, because, when thinned for use with turpentine or varnish, there is no bronze bloom to float up on the surface, as there is with Chinese blue.

Soluble blue is prepared by treating the insoluble Chinese or Prussian blues with an oxalic acid solution, but the aniline blues are taking its place for many purposes. Still, there is a good market in other directions for the article. It is said that one part of oxalic acid will dissolve six parts of blue.

—19—

Antwerp Blue.

Now very seldom called for, it used to be a great favorite with artists, decorators and coach painters. It is really made on the principle of Chinese or Prussian blue, but with the addition of alumina hydrate introduced during the process, hence its paler color or shade. It was imported from France and Belgium under the name *bleu mineral*, but was very apt to liver when ground in drying oil or coach japan, due to the presence of alumina hydrates.

—20—

Copper Blues.

Mountain blue, Bremen blue, blue verditer and lime blue have gone out of the general market, since so much progress has been made in the manufacture of aniline blues. All of these were made from the salts of copper, although mountain blue is also found in nature. All of these have the greenish blue tone of the copper blues.

BROWN PAINT PIGMENTS.

—21—

Umbers.

Umber earths are of greatest importance in the line of brown pigments, and the very best quality comes from the Island of Cyprus. It is usually designated as Turkey umber, because originally shipped by way of Constantinople. Umber owes its color to oxide of iron, together with manganese oxide, and its general composition is related to that of the ochers and siennas, the chief difference being that umbers contain large portions of manganese oxide and less clay than yellow ochers, while umber contains from seven to eight times more manganese than siennas. Raw umber is simply the earth as mined, ground and dried, and the best quality has a dark olive toned hue, devoid of the reddish or yellowish cast. When mixed with white it should produce a clean but fairly warm olive drab tint. Raw umber from other sources cannot compare with the Cyprus quality in richness of tone, fineness and absence from grit or in tinctorial strength. Burnt umber is simply the same raw earth calcined at red heat in a furnace, which, by expelling the combined water it contains, makes the color much darker and the tone warmer. The umbers from Cyprus, when burnt, assume a color of violet brown, which is lacking in those from other sources. The chief value of umbers is in their great permanence in their use as stainers and tinters, as well as when employed in composite colors. Should be tested for richness of tone, tint with white and for fineness and tinting power. For ordinary purposes there are some very good umbers of domestic origin that serve very well for colored fillers in industrial manufacture, such as the backing of oil cloth, linoleum, in coach roughstuff as filler, and the like.

—22—

Vandyke Brown.

The Vandyke brown most highly valued by stainers and grainers is that known as Cassel earth or Cologne earth, so named from the location of the mines. Being of organic origin, a mixture of peaty substance and earthy matter, it is not well adapted for tinting, as it does not hold its color well on exposure. For use as water or oil color it needs simply fine grinding, when it is ready to be thinned for use. Being of a darker and warmer brown color than burnt Turkey umber, it is almost indispensable to the grainer. Should be tested for richness of tone, tinctorial power and the tint it produces with white, which should border on a warm gray with violet tinge. If a full gray when mixed with zinc white its tone is poor, and it is unfit for the use of the grainer. Much of the Vandyke brown offered is simply a mixture or mixtures of any black pigment with inferior red oxide and yellow ocher. Vandyke brown, no matter how made, can be mixed with any other pigment, and, like, umber, is unaffected by them, nor will it in turn affect other pigments.

—23—

Siennas.

Sienna earths, raw and burnt, are very valuable pigments, not only to the grainer and stainer, but to the all-around painter. The best specimens are and have been from Italy, whence the pigment derived its name, Terra di Sienna, the locality where it is said to have been first mined. Of late some very good qualities of sienna, especially in point of strength, have been mined and placed upon the market, both in the raw and burnt state. With the exception that the percentage of manganese oxide is very low in siennas, their chemical composition resembles that of umber very closely.

Although painters at the present day favor the stronger stainers in siennas, their chief value lies in the rich translucency of the finest grades, and in selecting siennas for his purposes the grainer should keep this point in view. Burnt sienna is simply the raw material that has undergone a process of calcination at red heat, the same as burnt umber or burnt ocher, but while the latter burns to a more or less dark red sienna assumes more of an orange red color. Siennas are the most permanent of all earthy pigments in oil or water and are also valued for tinting white pigments to warm tints not given by ocher or red oxide of iron.

Well selected Italian siennas, raw and burnt and ground very fine in linseed oil or varnish, are especially valuable in the preparation of natural wood stains, such as light and dark oak, cherry and mahogany. Very pretty and permanent cream tints or buff tints are produced by tinting white paint bases with raw sienna.

—24—

Asphaltum in Oil.

This is used only by artists for glazing, on account of its rich brown tone. More seldom by grainers for overgraining. To prepare this properly Syrian or Egyptian asphaltum is used after crushing the lumps and grinding the material in drying linseed specially prepared. Placed on the market in small containers, chiefly collapsible tubes.

—25—

Sepia.

Sepia is a pigment of dark brown color, much favored by artists and draughtsmen for illumining drawings. It mixes well with oil or water and when well prepared is very permanent in either form. It is semi-transparent, but has great staining power and a great variety of tints can be produced by its use, and it may be mixed with almost any other pigment.

—26—

Bistre.

This pigment is not safe to use as an oil color, but gives a fine, warm brown with yellowish tinge when used as a water color. It is made from the soot of beechwood, but is becoming more and more obsolete. Unless carefully prepared it is very unstable.

GREEN PAINT PIGMENTS.

—27—

Chrome Greens.

When we refer here to chrome green we do not mean oxide of chromium or true chrome green, but to mixtures of Prussian blue and chrome yellow, as they are produced by the precipitation process by the color makers. Whether chemically pure or extended with inert mineral pigments, they may be termed paris green substitutes, for which they were intended originally. Each and every colormaker prepares at least four, sometimes six, shades of blue-toned and yellow-toned chrome greens, using in some a nitrate of lead, in others an acetate of lead base. When made without the addition of inert mineral pigments, from pure Chinese or Prussian blue and chrome yellow, with or without the addition of lead sulphate, they are termed "chemically" pure, otherwise they are known as "commercial" qualities of chrome green. Long usage has consented to consider a chrome green consisting of 25 per cent. pure coloring matter and 75 per cent. barytes, a good commercial quality of green, one that could not be termed adulterated for special gain or advantage. And it is a fact conceded on all sides that such a green makes the best paint for all-around exterior work, because it wears far better with the addition of barytes than the chemically pure article, which shows up after a certain length of time as a mere stain. On the other hand, when employed as a stain or when mixed with varnish for enameling, etc., or for tinting white, the inert material is useless and the pure color preferable and more economical by far. The value of these greens is determined by their brilliancy of tone, fineness of grinding and their staining power, also by non-separation of blue and yellow, when thinned to the utmost. The nitrate of lead greens, as a rule, have greater opacity or hiding power, the acetate of lead greens having greater tinting power. Of course, it is not fair to compare a blue-toned green with one of the yellow tone, nor is it fair to compare nitrate of lead greens with those made from acetate of lead, the latter being cheapest in cost of manufacture and known to be less permanent on exposure. Almost all manufacturers have a proprietary name or brand for their commercial qualities of chrome green.

—28—

Oxide of Chromium or True Chrome Green—Guignet's Green.

This is the best made and most permanent of all green pigments. It must not be confounded with the so-called chrome ocher, which is not more than a greenish clay, containing less than 10 per cent. of chromium oxide. Guignet's green is highly valued and is sold as Viridian, Emeraude green and various other names. Being insoluble in either acids or alkalies, it has a deep, brilliant green color with a slight yellow tinge, mixes well with oil or water, has good body and mixes well with all other pigments. Its high price, however, confines its use to artistic and decorative work. To test its purity it should be boiled with caustic soda solution, when it must not be acted upon.

—29—

Ordinary Oxide of Chromium Greens.

These are made by a different process from that used in making Guignet green and are very poor in color in comparison, but also much cheaper, and answer very well the purposes of the soapmaker and calico printer. They are very pale in shade and have but little staining power, and though not as permanent as Guignet's green, are unaffected by acids and alkalies to quite an extent. A comparison will determine their value, especially when made as to color and strength.

COPPER GREENS.

—30—

Emerald Green or Paris Green.

Also known as Schweinfurt green, is an aceto-arsenite of copper, containing practically 31.5 per cent. oxide of copper, 58.5 per cent. arsenic oxide and 10 per cent. acetic acid. The pigment is very poisonous, and to this characteristic is due its relegation to the rear in spite of its brilliant color. It cannot be mixed with any sulphide pigment and is also affected by alkalies, and very little of this color is used at present, excepting for decorative effects in coach and sleigh painting, where it is covered with varnish.

For ornamental work the French paris green is really the only brand suitable, while the American make, which is considerably lower in price, is used in large quantities as an insecticide, although London purple has taken its place to some extent for this purpose. That both of these pigments are very strong poisons is a well-known fact.

—31—

Verdgris.

This is basic acetate of copper, a pigment of green-blue color. When pure, it is readily dissolved in liquid ammonia without sediment, making a deep blue solution. The best grade is known as French distilled, and although more soluble in water than the ordinary, is preferred for marine use as an insecticide. As a pigment, it is not permanent, but in spite of that, it is used for decorative effects. It is hardly necessary to say that the pigment is very poisonous.

—32—

Mineral Green (Malachite).

Is a natural basic carbonate of copper, of which large quantities are found in Siberia, but which can also be prepared artificially. Has fair permanence and works well in oil and in water. To test it for purity, place some in a test tube with hydrochloric acid, which must dissolve it with effervescence. It is not much used in this country.

The greens shown on ready-mixed color cards as malachite green are simply green tints made by coloring a white base with chrome green.

—33—

Other Copper Greens.

Green verditer and Bremen green are basic carbonates of copper, but are not now in use, having been replaced by lime-proof aniline greens.

—34—

Terre Verte or Green Earth.

Terre verte or green earth or Verona green as it is also called, is found in Italy, France, Cyprus, Bohemia and many other localities, the best specimen, however, coming from Italy. It is practically a silicate of magnesia, colored by ferrous oxide. It is highly valued on the palette of the artist, because admissible in many technics. When calcined the pigment assumes a peculiar brown color, similar to brown ocher. The pigment is very permanent when used without being toned, as is now the custom with aniline green. Terre verte has a pale bluish-gray color, but the best selected specimens show a blue-green tone, and these are

the proper qualities for artists. Great quantities of so-called green earth that has a greater resemblance to road dust than to green earth are used as a base for lime-proof green, the coloring matter being aniline green.

—35—

Zinc Green or Cobalt Green.

Zinc green, or cobalt green, is made by pulping zinc oxide and adding to it a solution of nitrate or sulphate of cobalt. When the mass is dried and calcined at red heat it is thrown into water, ground, washed and dried, producing a very fine green, which is absolutely permanent and miscible with all other pigments. The lighter shades have fair body; the deep shades are nearly transparent.

—36—

Composite Greens.

Bronze greens, bottle greens, olive greens, etc., are mixtures of drop or lamp-black, Prussian or Chinese blue, yellow ocher or chrome yellow or chrome green in varying proportions, according to formula or the fancy of the mixer.

Low-priced greens of this class are cheapened by the addition to the material above referred to as inert pigment, such as barytes, clay or asbestine, etc.



RED PAINT PIGMENTS.

—37—

American Vermilion or Chrome Red.

This is known to the trade as scarlet lead chromate or chrome red, sold under such names as Persian scarlet, imperial scarlet, derby red and similar terms. It is a basic chromate of lead, composed of white lead and chromic acid, treated in a different manner from the process or method employed in the production of orange chromes. It is a heavy pigment of great body, that requires very little oil or thinners for spreading, but assumes a rather brownish tinge on exposure. This pigment cannot be used with pigments that have sulphides as base, such as cadmium or ultramarine, lithopone, etc., as in that case it would tend to blacken, but used by itself and with many other pigments that are free from sulphur it is permanent.

American vermilion or chrome red has been relegated to the rear in many places, where it has held sway for many years, especially in the painting of railway equipment, agricultural implements and a great mass of work where brilliant, non-fading reds are in favor, paranitraniline red taking its place, and where the bleeding of this is objectionable, toluodine red, which is practically non-bleeding, has cut out the use of the chrome red. While both para toners and toluodine reds are much more costly, they admit of being extended with large percentages of inert pigments, and thus make their use not beyond reason as to cost.

—38—

English or Quicksilver Vermilion.

This is the pigment that has been accepted as the only sure one deserving the name of vermilion (or cinnabar). It is a compound of mercury (quicksilver) and sulphur in about the proportion of 200 parts of the former and 32 parts of the latter. It is known to chemistry as sulphide of mercury and under the

formula Hg. S. It is found natural in Spain and in Idria, Austria, as mineral cinnabar. But most English vermilions are produced artificially, and it is with this we have to deal in this country. There are several shades, P. P., P. D. and D. D., and while this pigment has been superseded by coal-tar derivatives, it is still used to some extent because of its great opacity. The pale shades turn brownish very soon after exposure, while the dark shades turn gray or black inside of a year, returning to the black sulphide of mercury.

To test the purity of this vermilion heat a small portion in a porcelain dish or crucible with contact of air; if pure, only a trace of ash will be left behind, otherwise, if adulterated, it will show the residue of the mineral with which it is adulterated.

Owing to the blackening tendency of these vermilions and their high cost, para reds and Toluodine red are being successfully substituted for them.

—39—

Substitute Vermilions or Vermilionettes.

In times gone by these were made from red lead and orange mineral of German or French origin, colored with eosine, and some of these were so well made as to match the color and tone of English vermilion very closely. Others were made very cheaply, containing barytes and used for brush work, on wagons and farming implements, while others again were made with carbonate of lime (whiting) to be used for the same class of work, thinned with petroleum naphtha for dipping. When the coal-tar derivative, paranitraniline, was discovered, however, it was taken for granted that a new pigment could be formed, which was better than the American, English and substitute vermilions in the way of permanency, durability and economy, which paved the way for the

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Para Group of Reds.

The coal-tar derivatives used in this group are known to the color makers as paranitraniline, betanaphthaline, metanitraniline, alpha naphthaniline, and the process is quite intricate. Great care and very low temperature are required in the manufacture of this red, as the least deviation in temperature will ruin any batch. The pure colors are used only in the manufacture of color varnishes, while the reds required for body paints need an inert base, such as natural barytes, precipitated barytes, china clay or chalk (whiting).

These reds were first introduced into this country in 1893 and 1894, but are now the most important red pigments for painting railroad signals, cabooses, etc., automobile, coach and car painting and wagon and implement painting. Enormous quantities are used annually in paints, varying from the pure dyestuff or color down to such as contain only 5 per cent. of the pure coloring material, extended with all sorts and kinds of mineral pigments. When made with fair percentages of pure color, well made and the proper inert mineral bases, they are more permanent by far than the vermilion substitutes or the genuine quicksilver vermilion, but many of them are not well balanced and turn white or a plum color. To test their value, look for brilliancy and strength, not, however, placing too much credit to the latter point, as those made with natural barytes as base are usually stronger than those based on precipitated barytes (blanc fixe), yet the latter have far better body and spreading power.

Test them also with hydrochloric acid for carbonate of lime, which will be found present when effervescing, and such red will not be found permanent in the presence of sulphur gases. A peculiar feature of these reds is that they blend very strongly into other colors, and into white especially. They should never be applied as lettering on top of white, nor should such a red be striped with white, unless a good coat of varnish is first placed over the white and mossed down. Lately some color makers have developed a para red that does

not bleed, but it is not so brilliant or so strong as those that have the tendency. To determine actual value make practical comparative tests by exposure to strong light.

As stated, under chrome red, certain large users prefer toluodine red to the ordinary run of para toners, because of its non-bleeding. To make a quick test for bleeding out, rub up a little of the dry red in oil or varnish, add a few drops of turpentine and place a few drops of the rubout on a piece of white blotting paper, hold it over a lighted match or candle, but not close enough to burn the paper, and if there is a bleeding tendency the oil or varnish with the turpentine will spread the color and bleed out into the paper, making a more or less discolored halo or ring about the drop of the rubout.

—41—

Indian Reds.

Indian red is a red oxide of iron, prepared from sulphate of iron (copperas) by calcination in various kinds of furnaces, where the water of crystallization is driven off, along with the sulphur oxides, leaving a residue known as rouge or colcothar. By regulating the temperatures during calcination many shades are obtained from a bright scarlet to a dark purple, and the product obtained is a practically pure oxide of iron, with not over 5 per cent. of silicious matter. For general exterior painting Indian red is too strong in sesquioxide of iron, and it would be of brighter color if extended with its own weight or more of calcium sulphate (gypsum), but for tinting it is best in the technically pure state. The same may be said of the strong, bright red oxides of iron, which are also made from copperas in pretty much the same manner. To determine the value of such reds, test them for richness of tone, fineness and tinctorial strength.

The United States Government specifications for Indian red are very exacting as to the percentages of either free sulphur or alkalies, and many have been the rejections of material, which otherwise passed the test for purity. While up to fifteen years ago all the Indian reds were imported, some of equal value is now largely manufactured in the United States.

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Oxide of Iron Reds.

These reds are very numerous, but whether they are natural hematites of iron ore or artificially prepared from copperas, they owe their color to oxide of iron. The strongest and brightest of these reds used to be chiefly imported and were known as Turkey red oxides, being composed of from 95 to 98 per cent. of sesquioxide of iron. The very best some thirty years ago came from the Crawshay mines of Wales and Forest of Dean mines and the material was ground, levigated and dried by Leech, Neal & Co., Ltd., of Derby, England, but when the mines became exhausted they were prepared from copperas in rotary furnaces. Similar goods have been made for the past twenty years in the United States. They command quite a high price and are not now used to any great extent, the Spanish native oxides being much in favor, because while not so rich in color, they contain anywhere from 85 to 90 per cent. sesquioxide of iron and are very much lower in cost.

Persian Gulf oxide, a very rich crimson toned red, testing 67 to 72 per cent. sesquioxide of iron, is also very much in favor and is also a native product, the gangue showing silicious matter and alumina. By adding inert extenders when grinding these reds some very good so-called Venetian reds can be produced and the paint grinder can readily regulate his standards as best suits his trade. To test these red oxides of iron is to make rubouts for color and fineness of grinding and determine tinctorial strength by mixing 5 or 10 parts by weight of the red with 90 or 95 parts white lead.

—43—

Venetian Reds.

Perhaps one of the most used pigments for exterior house painting and exterior painting in general is the so-called Venetian red. Very often red or burnt ocher passes under that name, but most of this pigment is manufactured from copperas in suitable furnaces where certain quantities of limestone or oyster shell lime is mixed with the copperas, the sulphur water from the latter imparting its sulphate to the lime, thus forming oxide of iron and sulphate of lime. The best Venetian reds contain, in the medium and dark shades, anywhere from 30 to 40 per cent. of sesquioxide of iron, while the very light or bright shades contain from 20 to 25 per cent. of iron, the balance being either hydrated sulphate of lime or sulphate of lime that has been dead burned in the furnace, making it incapable of absorbing water or crystallization again. These reds can be depended upon in all sorts of atmospheric conditions, while the reds that contain more than 5 per cent. of calcium carbonate are barred from use by railroad chemists on account of the action of sulphur gases on carbonate of lime and its liability to undergo a chemical change when attacked by such gases. There are many cheap and very inferior reds of the Venetian red order offered to the trade, and the consumer will do well to test such offers for fineness, tone and strength. To determine the presence of large portions of carbonate of lime in a Venetian red in oil, spread a sample thickly on glass and pour a few drops of diluted sulphuric acid on the color, when carbonate of lime will show its presence by effervescence in a more or less marked manner, according to the quantity present.

—44—

Tuscan Reds.

These reds are much favored because of their rich tone as compared to Indian red, and when properly prepared are very permanent. The best and most permanent Tuscan reds are those made by precipitating alizarine red lake on a base of Indian red and some inert mineral, like precipitated barytes or terra alba, and washing, filter-pressing, drying and pulverizing the pigments. The reds so prepared will not change under the influence of heat, as they will remain unaffected in tone or color when subjected to a temperature of 300 degrees F., and on exposure to sunlight will hold their own for many years. There are any number of cheaper grades of such reds, made with or without oxide of iron for a base, and when made with rose pink as coloring matter are not so bad, but many of them are made with fugitive dyestuffs, and these the consumer should beware of. Recently Tuscan reds have been introduced on the market, consisting of iron oxide and inert mineral, sometimes carbonate of lime bases and alphanaphthylamine coloring matter. These are liable to bleed like the para reds. Subject Tuscan reds to heat, side by side with standards, and note effect. Test for richness of tone, fineness of grinding, and to determine comparative value test for tinting strength, but do not compare the alizarine toner red with one that is toned with a red of the para group.

—45—

Red Lead and Orange Mineral.

As a matter of economy and expediency, red lead should be bought in the dry form and strictly pure. If there is any stretching to be done, the consumer can do it himself. As a protector of iron from rust pure red lead only will be the most effective medium. When dry red lead of good fineness and unquestioned purity is mixed on the spot immediately before application with pure raw linseed oil, the resulting coat is a film that has cementing properties, due to the exodizing action of the red lead on the oil. Red lead, extended with mineral pigments or red lead that has been mixed with oil for any length of time loses that quality

to a great extent, to which is due the force of argument advanced by the opponents of red lead, that the pigment is a promoter of rust rather than a preventive. Red lead is used in many industries, in color making, in cement manufacture, glass making and notably in the manufacture of japans and varnishes.

Orange lead, or, as it is known in the United States, orange mineral, is a finer type of red lead, much lighter in color, cleaner in tone and lighter in specific gravity. While red lead is made from lead ore direct, orange mineral is prepared from white lead. To test either for purity boil a little of it with diluted nitric acid in a test tube until decomposed, and if there is no insoluble precipitation the article is pure. The painter will test for miscibility with oil and for holding up without runs or sags on vertical iron surfaces.

Red lead that is claimed to be non-settling or non-oxidizing has appeared upon the market for some time, and while the claim has been substantiated, it must be said that this very feature of its non-oxidizing tendency does not make it a perfect rust protector to iron and steel.

—46—

Red Lakes.

The best red lake and really the only permanent red lake is that made from alizarine, the artificial coal-tar derivative, that has precisely similar constituents to the madder root. In fact, red lake of that source, when well made, outclasses genuine madder lake in point of permanence. There is no pigment, except, perhaps, burnt sienna, that is as permanent. While not as brilliant nor as rich as French carmine, when freshly applied, it will, after two or three months' exposure, outdistance the latter two to one in holding its tone and color. Other red lakes have aniline or other fugitive coal-tar colors for their coloring material, and on that account are not at all in the race. Rose lakes, unless they are made with at least a portion of alizarine, are very fugitive. Rose pink is almost indispensable in the line of painters' colors, as it is needed for use in graining and stain making, and the chief point is brilliancy and strength.

Rose pink as now on the market is not a wood lake, but its coloring matter is a coal-tar derivative known as Orseilline, fairly permanent with a base of alumina sulphate. Test for strength with white against competitive brands.

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YELLOW PAINT PIGMENTS.

—47—

Chrome Yellows and Orange Chromes.

Color makers place upon the market as the lightest shade canary yellow, light or lemon yellow, medium chrome yellow, orange and dark orange yellow, the latter being close to chrome red. The medium shade is normal or neutral chromate of lead; that is, it has no addition of basic material, like the lemon and canary shades, which can be produced only by adding a white base, such as lead sulphate, when precipitating the bichromate of potash or soda on the lead salt. (When lead acetate has been used the yellow is termed sugar of lead yellow, or when nitrate of lead is used it is termed nitrate of lead yellow.) The usual quantity of lead sulphate permissible in a lemon or primrose shade of chrome yellow, if it is to be considered pure, is 40 per cent. The medium chrome yellow, as noted above, must be free from all added material in order to be considered chemically pure. The orange chrome yellows consist of basic lead chromate. In all chrome yellows a distinction is made between those made with nitrate of lead, they being considered more permanent and of better body than those made with lead acetate. At any rate, the cost of manufacturing the former

is considerably higher than that of producing the latter. Chrome yellows should be tested for clearness of tone, fineness and tinting strength, but allowance should be made for difference in depth in two yellows of the same name as to shade. For instance, one light or lemon chrome yellow may be nearly as deep as another make of medium chrome yellow, and it is not fair to make a comparison between two brands so widely different in shade.

—48—

Zinc Yellow-Zinc Chromate.

This yellow is more permanent by far than any of the lead chromes, and ground in oil or water it is usually sold as permanent or perfect yellow. It is essentially zinc oxide and chromium trioxide in the proportion of 45 parts of the former to 55 parts of the latter. It can be mixed with any other known pigments with safety and will not blacken by contact with sulphur gases. Usually a pale lemon tint, it can be made in medium or even dark shade. While it has fairly good body, it is not equal in that respect to the lead chrome. Test for clear tone, fineness and tinting strength.

—49—

Yellow Ochers.

Of ochers, the French yellow ochers are most favored. The best qualities run in shades from pale yellow (so-called citron) to almost dark spruce color and their contents of sesquioxide of iron from 12 per cent. to 28 per cent., the balance being silicate of alumina (sand and clay), with about 10 per cent. of combined water and hygroscopic moisture. The citron shade, with an average of 20 per cent. oxide of iron, is most favored, though the stronger quality, known as J. F. L. S. Superior Quality, which commands the highest price, is also called for. This is usually sold as French Oxford ocher, although it cannot compare in tinctorial strength with some of the English ochers, which show as high a percentage as 60 per cent. of oxide of iron. While there are any number of fairly good and strong American ochers, the French importations have the call, because of their chrome tone and brightness. Ochers are selected and valued, first, above all, for their brightness and freedom from grit, and then for their opacity of body and tinting strength. It is, however, not always the ocher that is strongest that is the best for the painter's use, the other valuable properties must also be combined with it.

—50—

Golden Ochers.

Golden ochers or chrome ochers do not have the call now that they had years ago, probably due to the fact that consumers find it to their advantage to purchase the ocher and chrome yellow separately and mix these to their own taste. The native chrome ochers do not possess the brilliancy of a mixture of French yellow ocher and chrome yellow, and the best golden ochers consist of mixtures of pale ocher and medium chrome yellow for the light shades and deep ocher and orange chrome yellow for the dark shades in varying proportions. To determine their value, they are tested for richness of tone, fineness of grinding and tinctorial strength. Imitation gold ochers used to be quite the rage years ago, because of their comparative cheapness, and were simply mixtures of small portions of yellow ocher and chrome yellows, with very large quantities of barytes and whitening.

—51—

Naples Yellow.

Though little in use at present, it is an interesting paint pigment. It is composed of the oxides of antimony and lead fused in crucibles with the aid of salt, the resulting product being well washed, dried and powdered. When zinc oxide is added then fusing pale shades are produced. The shades are scarcely ever uniform, unless various batches are mixed together. Naples yellow is a fine pigment of great body and covering power; works well in water or oil, but cannot be mixed with sulphides, such as cadmium yellow, ultramarine, etc. Iron has an injurious effect upon it, so that it should not be ground in iron mills. Some fairly good imitations can be made by tinting white lead with raw sienna and a tinge of lemon chrome or zinc yellow for the pale shade and by tinting white lead with raw sienna and deep orange chrome yellow for the deepest shade.

—52—

Indian Yellow.

This strange yellow pigment, also known as purree, has been in use for ages in the East Indies, but very little is used in the Occident. It is known to science as a compound of euxanthic acid, which is part of the urine secreted by a species of cows that are fed on the leaves of the mango tree at Monghyr, in Bengal. The Gwalas, who own these cows, collect the urine and boil it down each evening in earthen vessels, precipitating a yellow pigment that is gathered on calico, made into balls and placed upon the market. The annual production is said to be less than six tons. The pigment was offered in the London market at five shillings per pound during 1908. It is a fairly bright yellow pigment, specimens showing mediums and orange yellow color with greenish undertone, when rubbed out in oil, but, as it is slightly soluble in water, it will not serve as a water color and is not very permanent in oil, though favored by artists. True purree emits the unmistakable odor of cow manure and is, therefore, readily recognizable by its odor. Good imitations are made with coal-tar derivatives, but the rather high price of either forbids general use.

—53—

Cadmium Yellow.

Cadmium yellow, a compound of the metal cadmium and sulphur, with the chemical formula Cd. S. , is made by passing a current of sulphuretted hydrogen gas through solutions of salts of cadmium in the form of sulphate or chloride. It is made in three shades or modifications of lemon, medium and orange. When made in the proper way and strictly pure, this pigment is the most permanent yellow known and totally unaffected by contact with sulphur gases or when exposed to light and air. Only when mixed with pigment with a base of lead or copper will these yellows become brown or tend to blacken. The utmost care is required in grinding them to keep them from being contaminated with lead and copper. To grind them in iron mills is liable to produce a dull color from contact with the metallic iron. The color in oil or water, or whatever vehicle it is ground in, must not be packed in tubes or other packages containing any portion of lead, nor should the color be applied directly over a ground of white lead. Its high price prevents general use in any but ornamental or decorative painting, although since it has been lowered in selling price it is being employed for coach and car painting as a finishing coat in the nature of a glaze over groundwork of similar color made from chrome yellow. In this case the ground is so prepared in application that no action of the lead chromate on the cadmium yellow can take place, the binder in the ground coats preventing it. Adulteration of cad-

mium yellow rarely takes place, though in the palest shade zinc oxide has been discovered. To test for purity dissolve the dry pigment or the extracted pigment in strong hydrochloric acid, when sulphuretted hydrogen should evolve, and a clear, colorless solution be obtained.

—54—

Yellow Lake.

Yellow lake or "stil de grain" as it is called in Continental Europe, derives its color from quercitron bark. It has also been made from yellow buckthorn berries or Persian berries. In the use of either, a decoction is made by hot water, and this is precipitated by a solution of hot water and liquid ammonia. The precipitate, as usual, is washed, filtered, dried and powdered, or the washed pulp is shaped into drops or tears, dried and marketed. The quality sold as superfine French yellow lake is the best, because most transparent and brilliant. An excellent yellow pigment to use for brilliant effect with greens and as a transparent glaze over greens and made to produce certain effects. Test for clear tone and transparency.

—55—

Dutch Pink.

Also known as English pink, Italian pink and yellow madder, is manufactured in a similar way to yellow lake, that is, the same coloring agents are used. But as the market price of these is only one-tenth, or even one-twentieth, of the former pigment, it stands to reason that the proportion of coloring matter is comparatively small and that a mineral base is present to a very large degree. This consists usually of either magnesium silicate or aluminum silicate, but sometimes of whiting. The presence of the latter can be ascertained by dropping hydrochloric acid on the dry powder, when effervescence takes place. The pigment containing whiting is undesirable. Dutch pink, when mixed with oil, has a brownish green color, similar to the color of light tobacco, but it is a valuable adjunct in making stains and as a filler for greens, cheapening these, and at the same time imparting a sap green tone to those of bluish character. But as a color in oil or water, neither of these so-called pinks or the yellow lake are permanent on exposure to light. Test for tinting strength and fineness only.

—56—

Brown Pink

Is merely a very deep quercitron lake that usually turns to a bluish gray on short exposure to strong light, yet sometimes it seems to hold its color fairly well, especially as a water color. Is very little used, however, excepting as an artist's color.

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LAKE PIGMENTS.

—57—

Madder Lake.

As noted under red pigments, alizarine red lakes have driven genuine madder lakes pretty well from the market, but there are some artists and decorators who prefer to use the latter. In the manufacture of these lakes, garancine is

preferable to the use of the root. Garancine is an extract of madder prepared by steeping the root in a solution of sulphate of soda and washing. This lake is usually sold in drop form, and to test its purity try to dissolve it in liquid ammonia, somewhat diluted. To be pure it must prove insoluble in this reagent, but soluble in solutions of caustic soda or potash.

Genuine madder lake, as prepared from garancine extract, is favored by artists, because it produces delicate tints, that are not obtainable by the use of alizarine red lakes.

—58—

Cochineal Lakes—Carmine.

Carmine, when pure, is made from best cochineal, with citric acid, gelatine, borax and alum (that is perfectly free from iron) as assistants. To obtain it in greatest brilliancy it must be free from all contact with iron. Carmine should be tested for brilliancy and tone. It should be deep, fiery scarlet and dissolve in caustic soda or potash or ammonia solutions with deep crimson color, leaving no residue in order to be pure. Works well in oil or water, but is not permanent, going to pieces within six months on exposure to strong light.

—59—

Carmine Lake.

In making carmine there is waste liquor, because all of the coloring matter is not precipitated, and to this waste liquor certain quantities of alum is added in solution, and after again boiling the product is permitted to settle, the precipitate washed, filtered and dried. Carmine lakes are made in light and dark shades, but lack the fire and strength of carmine. These lakes are now very seldom called for or used, because of the greater permanency of alizarine red lake on exposure.

—60—

Crimson Lake.

Formerly made from Brazil wood or the residue recovered in the making of cochineal lakes, but now prepared from alizarine dye.

—61—

Scarlet Lakes.

The coloring matter for these is a coal-tar derivative known as Ponceau red, precipitated on an alumina sulphate base. They are sold as carmine substitute, and while not as brilliant as carmine, are nearly as fast to light and very much lower in price. Also sold to decorators as Turkey red for interior work in distemper.

—62—

Geranium Lake.

Is actually prepared similar to carmine by using more of cochineal insects in boiling the coloring for the alum base.

—63—

Maroon Lake.

Formerly a wood lake, is now made from coal tar derivative of the alizarine group and fairly fast to light.

—64—

Violet and Mauve Lakes.

Are, without exception, at the present time basic coal-tar derivatives, and while not fast for any length of time to strong light, wear very well when not subjected to the latter directly.

—65—

Blue and Green Lakes.

These are usually made from acid coal-tar dyes and some of them are fairly permanent for interior work, but will not stand outside exposure.

—66—

Caution About Selection of Lakes.

A word of caution to the color grinder will not be amiss. Many of the lakes that derive their coloring matter from coal tar have a base of alumina hydrate, and while they work well in printing or lithographic inks, they will invariably liver when ground in oil for the use of artists and decorators, or when ground in gold size japan or varnish. When making a purchase it is well to state that the color (lake) must not be on alumina hydrate base.

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VEHICLES AND THINNERS FOR PAINT.

—67—

Raw Linseed Oil.

In the general practice of painting linseed oil forms the most important item. It is waste of time to recount its virtues and defects, but the consumer should know how to discriminate between the pure and the spurious article. As cold-pressed linseed oil is a thing of the past, we will confine ourselves to that which is obtainable at present—hot-pressed linseed oil. Heat increases the yield, therefore, more mucilaginous and alubuminous matter must be present in the oil of today. Linseed oil has been, at times, adulterated with cottonseed oil, corn oil, mineral oil, rosin oil, rapeseed oil and fish oils, but when the price is normal or low adulteration with vegetable oils is out of the question, and mineral, rosin or fish oil additions are too easily detected to take the risk. At any rate, the goods, as they leave the hands of the crushers, will invariably be found pure. That does not, however, deter some dealers, whose greed for coin is greater than their sense of honor, from tampering with oil when the price is above normal. It may happen, from time to time, that raw linseed oil may be pure in a commercial sense, yet be unfit for accomplishing good results when used for thinning paint. This is the case when the oil contains a large percentage of foots, moisture or an undue proportion of mucilaginous and other foreign substance, all of which affect the proper drying of the oil and produce weak paint films. To guard against this the consumer should take samples in glass test tubes, and if the oil is cloudy set the tubes in a warm place until the oil becomes clear, in which manner the approximate quantity of foreign substance may be noted and the true value of the article determined.

To test for purity place ten drops of the oil in a watch crystal, and put one drop of oil of vitriol on the oil. If pure, the oil will first turn orange, then red and finally brown. If fish oil be present, it will turn first violet, then will change to black. Rosin oil may be detected by the odor and by the first color under the acid test, being brown, turning to black. Mineral oil, when present,

can be detected by the glacial acetic acid test, which will dissolve linseed oil, while mineral oil will not. Admixture with mineral oil will make paint sweat in damp weather, and driving rainstorms will wash down the paint on exposed surfaces. When rosin oil is mixed with linseed oil in paint for exposed surfaces the paint film is sure to part in time, or at least look like the skin of an alligator. Fish oil mixed with linseed oil produces trouble in repainting, even if the original painting has been apparently wearing well and still intact.

For all exterior painting of woodwork, and especially for priming or first coating, raw linseed oil is safer than any other.

—68—

Boiled Linseed Oil.

Fire boiled or kettled boiled linseed oil seems to be going out of the market of late, and to be only used by the varnish maker and possibly the paint maker and in oil cloth and printing ink manufacture. To a certain extent, so far as the wear of outside painting, where boiled linseed oil is used for thinning, this is not to be deplored, because the old fire boiled oil had some defect, as the oil was often overheated and its wearing qualities destroyed thereby. The latest method is to heat raw linseed oil in steam-jacketed kettles of large capacity to 250 degrees F. to drive off all moisture, and then introduce a certain percentage, not over three parts of so-called crusher's drier, which makes the oil dry in from 36 to 40 hours, when flowed on a strip of glass, which is placed in a nearly vertical position in a room of 70 degrees F. This boiled oil is certainly far superior to the bung-hole boiling process, by which gallons of raw oil are taken from a 50-gallon barrel and replaced with five gallons of rosin and benzine drier.

Double boiled oil, so-called, is simply pure raw linseed oil, as prepared by the crushers, and when bearing the crusher's brand in original packages the consumer need have no fear of adulteration. Blown linseed oil is boiled oil made more viscid by blowing a current of air through the oil while being boiled. Blown linseed oil is added in various percentages to outside paint in order to impart a higher and more durable gloss.

—69—

Refined or Bleached Linseed Oil.

Refined linseed oil is raw oil decolorized more or less by agitation with a small portion of sulphuric acid or with peroxide of hydrogen, then steaming it to free it from these chemicals again, or by filtration, after agitating with fuller's earth or bone black. While a pale oil is obtained thus that answers very well for white and delicate tints for interior work, for use with pale varnishes, etc., it should not be employed in thinning paints for exterior use, as it does not wear as well as raw oil and is really unnecessary in that connection, because raw linseed oil will bleach out at any rate and lose its yellow cast when exposed to strong light and the atmosphere.

—70—

Soya Bean Oil.

Soya bean oil came to be used extensively during the last twenty years, whenever linseed oil was high in price. This vegetable oil, which in many respects closely resembles linseed oil, has been and is still imported from Manchuria, although the bean is also grown in Japan to a lesser extent and has lately been introduced in the United States and good crops raised in the South, where the soil is most favorable for its growth and where the cottonseed oil mills are adapted for the crushing of the beans. This oil must be classed among the semi-drying oils, as it is not safe to be used in paints by itself alone, but requires

admixture with a fair portion of raw or boiled linseed in order to produce a paint film of greater resistance than is possible when soya bean oil alone is being used. Unless pure linseed oil is part of the specification in an oil paint, soya bean oil need not be considered an adulterant, as from future outlook there will not be sufficient linseed oil to supply the demand of the trade, and soya bean oil being a most available substitute, it will be most naturally looked to for supplying the wants of the trade. As stated above, soya bean oil closely resembles linseed oil in specific gravity, saponification point, but is very low in its iodine value, which accounts for its slow drying, which can be corrected by mixing with linseed oil and a slight increase in the percentage of dryers.

—71—

Poppyseed Oil.

This oil is used largely in paints by European painters, but in the United States its use is confined to the whites and colors used by artists and decorators. Some years ago zinc white ground in poppyseed oil was in good demand, but of late this has dropped off, owing to the fact that there was no benefit to be derived from zinc white ground in that oil, when its greater whiteness was again counteracted by using linseed oil and dryers for thinning. Poppyseed oil dries but little more slowly than linseed oil, and it bleaches of its own accord when held in stock for some time, becoming paler day by day. Its high price, which is nearly three times as high as that of linseed oil, is against its more common use.

—72—

China Wood or Tung Oil.

This oil has been used in China and Japan for centuries in caulking of wooden vessels, as it has waterproofing qualities, also in the preparation of lacquers, etc. For the past thirty years it has been used in the varnish factories of Europe and twenty-five years ago it was introduced here. The great virtue of this oil is that it oxidizes more rapidly than any other oil known, drying all the way through its film, instead of forming a skin on top and remaining soft underneath. It enables the varnish maker to make a tough varnish from soft resins, which was heretofore almost impossible. However, this oil, which is readily recognized by its odor of hog fat and its drying opaque in the raw state, has a tendency to shrivel badly when used alone, unless it is treated at a temperature of not over 360 degrees F. If heated to a greater degree, it is liable to gelatinize, and nothing is known to ever bring it into liquid state again.

—73—

Perilla Oil.

This oil is expressed from the seed of a plant grown in China and Japan, and while not as yet an article of trade, promises to become quite a factor in the paint and oil cloth making industries, and if the seed can be grown in the United States the oil will become quite a rival for linseed oil, it producing a firmer film of similar drying capacity when a similar portion of dryer is being employed. Researches are being made by the Educational Bureau of the Paint Manufacturers' Association of the United States and investigations carried on for locating the proper soil for planting the seed.

—74—

Lumbang Oil.

This oil, which resembles China wood or Tung oil in many respects, is extracted from the fruit of a shade tree of the *aleurites moluccana*, a native of Polynesia and other parts of Asia and other tropical islands, such as the Philippines and Hawaii. It also flourishes in certain parts of Florida and the Gulf coast, where it has been introduced experimentally. Like the Tung tree, it bears a nutlike fruit, which, however, is not bottle-shaped, like the latter, but more round, like walnuts. Unlike the kernel of the Tung nuts, it is not nauseating, but edible, yet the taste is somewhat similar to that of castor oil. The expressed oil has similar specific gravity and saponification number to soya bean oil, but has a higher iodine number and much better drying qualities. As far as its use in paint or varnishes is concerned, it is still a matter of experiment, but there seems to be great possibilities for its general use, when the tests are further advanced and locations discovered for extended cultivation of the tree, which are said to yield two crops in a season.

—75—

Sunflower Seed Oil.

Is a semi-drying oil, similar to soya bean oil in constituents, drying even somewhat slower, and it is not produced to any extent for use in paints or varnish.

—76—

Cottonseed Oil.

Before its great advance as a cooking or table oil this oil was used by paint makers in small percentages with linseed oil in putty and in some paints to prevent rapid oxidation, its present higher cost forbidding its use in that direction.

—77—

Corn Oil.

This oil has a lower specific gravity than either linseed, cottonseed or soya bean oil, and on becoming heated in a paint mill gives off an odor similar to molasses, and the paste produced has a somewhat dry grainy appearance, showing a lack of unctuousity. When its cost was still comparatively low it was used in making cheap putty.

—78—

Hempseed Oil

Which is largely used in Europe, is not known in the United States, excepting as it comes mixed with the oil expressed from Baltic linseed. From all accounts, however, this oil, though darker than linseed, is as good a drying medium for paint and one that wears longer than linseed oil.

—79—

Walnut Oil.

The walnut trees of America and Europe, especially the former, produce a fruit that yields a good quantity of drying oil that is highly valued and extensively used by artists and paint makers, also soap makers, in Europe. When specially prepared by removing the skin from the seed or kernel of the nut, an especially pale and rapid drying oil is secured. Readily recognized by its odor and taste.

—80—

Fish Oils.

Fish oils are not safe oils for paint, not alone because of their nauseating odor, but their high acid number.

—81—

Rosin Oil.

Rosin oils are of little use at this time, owing to their high price, and at any rate their use is or should be confined to naval use. The paints made with rosin oil as one of its constituents will, when exposed to heat, alligator and peel badly.

—82—

Spirits of Turpentine.

Of late there has been a fine distinction made between gum spirits and wood spirits. The former is the product from the sap exuding from the Southern pine tree, while the latter is obtained by the destructive distillation of the wood of the same tree. The so-called gum spirits has a sweet, though penetrant, pungent odor, while the wood spirit has a more tarry odor, that is disagreeable to the operator when working in a closed room. Both have similar specific gravity, and the only difference between gum spirit and wood spirit is that the former evaporates more quickly than even the best distilled specimen of the latter, and the bad odor referred to. When not well distilled the wood spirit has a tendency to yellow off white paint on drying, which is also the case with most turpentine substitutes, whose name is legion. To test turpentine, either gum spirits or wood spirits for adulteration, with mineral oils or petroleum products of any kind, fill a test tube to a certain height with the suspected article, then add to this an exactly similar volume of anilin oil (C_6H_5, NH_2), shaking the tube vigorously and standing aside. If, after five minutes, the liquid is not perfectly uniform but shows two strata of different color it is not pure turpentine. Even as little as 2 per cent. of benzine, gasoline or any other petroleum product will be noticeable if present by this test.

—83—

Venice Turpentine

Is the sap of the larch tree, which has been freed from water by boiling and straining. It has the color and consistency of pale honey and the characteristic odor of turpentine. It does not turn white like ordinary thick turpentine in contact with water, and it is useful in counteracting the brittleness of shellac varnish and to make it work more freely. Also used in decorators' sizes and in spirit lacquers generally.

—84—

Canada Balsam.

Similar to Venice turpentine and used for similar purposes, but somewhat inferior, because more penetrant in odor and remaining more tacky.

—85—

Petroleum Spirits and Painters' Naphtha.

Benzine, also known as painters' naphtha, and gasoline are the fugitive products obtained in the distillation of petroleum. That of lightest specific gravity comes over first and is termed gasoline. Next comes benzine, which is of higher gravity, and finally illuminating oil or kerosene. The benzine now known as painters' naphtha runs from 58 to 62 degrees Be, while gasoline runs about 68 degrees Be. Some years since benzine was graded 59 and 63 degrees Be, gasoline at 72 to 78 degrees Be, while of late years the gravity of these brands seems to be made lower, some benzine being as low as 49 degrees and 56 degrees Be. The latter are those spirits that are used as substitutes for turpentine, their flash point being about the same as that of spirits of turpentine. Gasoline is used in painters' torches and is good for cleaning brushes, but should not be used in paint, being too volatile by far. For thinning white paint for fine interior decorations the use of benzine should be avoided, as it will tend to yellow off, while turpentine is safer by far for this work.

—86—

Coal-Tar Benzol.

Coal-tar naphtha, or, as it is also called, coal-tar benzol, is very similar to benzine, but has a tarry odor and is far heavier in specific gravity. White petroleum benzine weighs close to 6 lbs. per U. S. gallon; 90 per cent. benzol weighs 7 lbs. 2 ozs. It is also very much slower in volatilization than benzine, hence valued as a solvent in many special varnish preparations. It is largely used in connection with paint and varnish removers that have been patented within the last decade, on account of its solvent powers when combined with such very volatile solvents as acetone, methylalcohol, and the like.

When staining birch, cedar or cypress wood, it will be beneficial to add about 10 per cent. by volume of coal-tar benzol of 90 per cent. to the stain.

—87—

Gloss Oil.

Gloss oil, so-called, is a solution of rosin in painters' naphtha or benzine, and is the vehicle for use in barrel paints, made largely for painting oil barrels of all kinds. It is also used in the preparation of the cheaper grades of varnish wall sizes and in many low-priced barn and roof paints.

EXTERIOR PAINTING.

—88—

Proportions of Vehicle and Thinner for Exterior Painting.

For Priming, two coat work:

For each 100 pounds white lead in oil, or for each 100 pounds of white lead in oil, tinted as may be required; the following thinners should be used: Four and one-half gallons raw linseed oil; one-half gallon turpentine, and from one pint to one quart best quality liquid driers, the quantity depending on weather conditions.

For second or finishing coat:

For each 100 pounds lead in oil, use: Five gallons raw linseed oil and one pint to one quart best liquid driers.

The above is the proper proportion for warm weather. In cold weather the thinner should be as follows: Four and three-fourths gallons raw linseed oil; one quart turpentine; one pint to one quart best liquid driers.

For three coat work the following proportions of thinners should be used for each 100 pounds of white lead in oil, or for each 100 pounds of tinted white lead in paste form:

For first coat or priming: Four and one-half gallons raw linseed oil; one-half gallon turpentine, and from one pint to one quart best liquid driers.

For second coat: Four and three-fourths gallons raw linseed oil; one quart turpentine; one quart best liquid driers.

For third coat: Four gallons raw linseed oil; one pint best liquid driers.

The weather and the strength of the driers must always be taken into consideration in determining the quantity of driers to be used.

The paint should be tinted in the paste form and the driers added to the thinners before they are incorporated with the paste paint.

The Veteran Painter.

—89—

Best Priming for New Exterior Woodwork.

A contracting painter asked our opinion on the best material for priming raw wood on the exterior of some dwelling houses in course of erection. One painter was in favor of white lead and oil, another in favor of a mixture of equal parts white lead and ocher, a third in favor of yellow ocher and oil and still another in favor of so-called white ocher.

Our unbiased opinion on the question of priming exterior wooden surfaces is invariably in favor of pure white lead, the hydrated carbonate of lead, ground in pure raw linseed oil as fine as possible, and reduced with at least six gallons of well settled pure raw linseed oil to the one hundred pounds of keg lead, with not over one quart of pure oil and turpentine japan in addition. This is recommended for soft wood, such as hemlock, white or red pine, etc. For Southern pine, the raw oil might be reduced to about five and one-half gallons, the deficiency being replaced by turpentine. If the primer is to be followed by green or other dark colors, it should be tinted lead color with lampblack; if for yellow tints it may be stained with finest French yellow ocher. When ocher is used only to give a buff tint to a priming of white lead and therefore not in excess, it is perfectly safe to employ it, but we should not advise equal parts of white lead and ocher, unless the lumber be very soft and spongy. Under no circumstances, however, would we put ourselves on record as advising the use of ocher for priming, because we have any number of proofs that the material is too brittle and, in fact, as a rule too coarse to enter the pores of the wood along with the oil and when the oil is finally absorbed by the wood, the ocher is left without sufficient binder and is very apt to cleave off, taking the top

coats along with it. If this does not happen during the life of the first painting, it almost invariably happens after repainting. The worst suggestion made, however, is that of using the so-called white ocher for priming. In the first place, this name is given to the most inferior grade of white paint that can be designed, as it does not contain, as a rule, anything but barytes and zinc white, both of which are unfit for foundation work, which priming really is in painting. Beware also of having boiled linseed or substitute oils and excess of driers in the priming paint.

—90—

Paint Peeling from Wooden Surface.

A patch of paint that peeled from an exposed surface of common pine lumber, that had been painted twice, was sent us with the statement that it is not due to moisture. On examining the reverse of the patch of paint, we find that the surface originally was primed with a heavy coat of yellow ocher. The grain of the lumber is clearly impressed thereon, and the surface of the patch shows that the last coat applied was sanded. The peeling does not prove very elastic and it is not at all surprising to us that the paint has come off in patches clean down to the wood. If a proper inspection is made, it will be found that all of the paint is inadhesive. It is only another of the many instances that go to show that ocher priming is a fallacy, unless done on very soft, porous wood and then only in a very thin oily consistency when extra fine ground ocher of very best grade is introduced as pigment or when mixed with pure white lead, about three parts by weight of lead to one part of the former. Ochres are good wood fillers, but from their very nature are brittle to a great extent and the oil from an ocher priming is absorbed by the wood, leaving the pigment minus the greater part of the oil on top of the wood. When the oil in the surface coats of paint has resinified or perished from exposure to the atmospheric conditions, there is nothing to hold the primer to the wood and the consequence is a splitting of the paint, part of the yellow color showing, as a rule, still on the surface, the greater part being visible on the back of the blotches of paint that is peeling or coming off in scales. The only remedy is to take off all of the paint clear down to the wood and begin to paint over again in good season with pure white lead as a primer, holding it rather thin and rubbing it out to the utmost.

—91—

Danger in Priming Too Soon.

A great deal of trouble is due to priming the poorly seasoned wood, of which most houses are built, as soon as it is up. There's an acid or something left in the wood by the modern lack of seasoning or dry kiln seasoning that injures the paint. It can be got rid of only by soaking it out, and it would be an advantage if a house should stand for six months before it is primed. Then the rain would soak this sap acid out of the wood. The priming coat don't stop the wood from cracking, and if you prime it at once, the paint will change and get all kinds of colors. The trouble is the carpenters want the priming done at once so as to hide the defects in the lumber from the owners.

The Veteran Painter.

—92—

Need to Season Wood Before Priming.

In my judgment all new wood is painted too quickly. The carpenters are in so much of a hurry to get the defects in the lumber covered up that they hurry the painter on to the job too soon, and for that reason the paint seldom stands as long as it ought. If they would allow the wood to season for several weeks or even months in the air after it has been erected, and let the rain

beat upon the wood and wash out the sap acids, it would do no hurt. Of course they will tell you that the wood will crack. But what if it does? It is easy to fill the cracks with putty and make them perfectly watertight and smooth. My opinion is that there is no way to make paint properly stay on unseasoned wood, and therefore it is best to give it a chance to season. If you are in a hurry and think you cannot let the house stand unpainted for several weeks, then play a hose on it and get the wood thoroughly soaked. But, of course, you don't want to paint the wood while it is wet, but you want to let it dry out first. The carpenter might object if he saw the painter start to play a hose on the woodwork he had asked him to prime, but the painter has his own reputation to think of, and if he can make his paint last longer and give better service by giving the lumber a good wetting down first he needn't mind the objections. The first time I had this brought to my attention was a good many years ago, when an owner let his house stand for six months before he would let us paint it. The boards darkened and looked weather beaten, but when we finally did get a chance to paint it it was the best job we ever did, and the paint outlasted any other job I have ever done on new work. The trouble with the modern lumber is that it is kiln dried and the sap acids dry into the wood and don't come out until the moisture from the plaster drives them out or the oil of the paint absorbs them. Of course, most houses are painted before the work of plastering begins. At any rate, the acids are there to injure the paint. I understand that spruce is particularly full of those acids. The only way to get them out is by dissolving them out with water, and that is one reason there was not so much trouble with paint in the days when they used rafted lumber.

The Veteran Painter.

—93—

Need of Care in Priming.

A good many house painters think anything is good enough for priming. They'll use any old material and slap it on right and left any way to get it on. But if you are going to use only two coats the priming coat must be just as carefully put on as the second coat, for it is impossible to cover zigzag brush marks with a single coat. And if a man is a good mechanic, it ought not to take him any longer to put on a coat of paint properly and evenly, rubbing out the paint with the grain of the wood to avoid brush marks, than it takes him to put it on any old way. And it makes the biggest possible difference in the appearance of the job, especially after a few months' wear.

The Veteran Painter.

—94—

Proportions of White Lead and Oil for Painting New Poplar and New Hard Pine.

For new poplar first coat (or priming): To 100 pounds lead in oil we would suggest $6\frac{3}{4}$ gallons pure raw linseed oil and one-quarter gallon oil dryer. Second coat: To 100 pounds lead in oil $4\frac{3}{4}$ gallons raw oil, one-quarter gallon oil dryer, and one-half gallon turpentine. Third coat: To 100 pounds lead in 4 gallons of raw linseed oil, one-quarter gallon turpentine and one-quarter gallon oil dryer. For hard pine would suggest for first coat (or priming): To 100 pounds lead in oil 5 gallons raw linseed oil, one gallon turpentine and one-half gallon oil dryer. Second coat: To 100 pounds lead in oil 4 gallons raw linseed oil, three-quarters gallon turpentine and one-quarter gallon oil dryer. Third coat: To 100 pounds lead in oil, 4 gallons raw oil, one-quarter gallon turpentine and one-quarter gallon oil dryer. These figures we consider to be best adapted for the timber named, provided that the white lead, oil and turpentine are strictly pure and that the oil dryer is what its name implies, a pure linseed oil dryer, without gum of any kind, boiled in the orthodox way and thinned with pure turpentine.

—95—

Cold Water Paint as a First Coater Under Oil Paint.

A painter had an old building to paint and desired to know whether a first coat of cold water paint would not make a satisfactory ground work for a finishing coat of oil paint, and if it would not be as good as two coats of oil paint.

No! Cold water paint has glue or its equivalent in one form or another as a binding medium, and while the water is absorbed by the wood or whatever surface the paint may be applied to, the glue binder and pigment will not enter the surface, but lay on top like a hard scale, through which the oil paint will not penetrate and it is only a question of time when both coats will scale off. We would much rather recommend the reverse, i. e., prime with oil paint and finish with cold water paint, though the best plan is to give either all oil paint or all cold water paint from start to finish.

—96—

Discoloration on New England Frame Houses Painted with Varying Combinations of Paint.

A property owner says that in New England many houses on which paint has been applied, even recently, show very marked evidences of discoloration, particularly under window sills, and as if a sudden rainstorm had struck the sides of the house. Oftentimes the discoloration can be washed off with a sponge. The trouble does not seem to be confined to one class of pigments, as it has been observed on houses where pure white lead has been used, as well as on those known to have been painted with combination leads, and shows most prominently on houses painted with shades or tints produced with yellow ocher and a little red and black. Here sometimes the color seems to bleach out, which cannot be explained by any chemical activity on the part of these colors.

We have had some isolated cases to answer, where paint became discolored, due to local conditions as to the use of inferior material, but none have ever been brought before us of so wide a scope or so general in nature. As to the discoloration of white paint or apparent bleaching out of tints under window sills, it can be noticed in the Middle States, as well as through New England. The bleaching out of colors or tints may be explained by the constant moisture after driving rainstorms, or rather the collection of dampness, which deadens the gloss at these places and makes the paint look lighter than where the gloss still remains. The soot, with which the air is impregnated most everywhere along the line of steam railroads and in the vicinity of manufacturing towns, collects on window frames and behind shutters and is thus washed down to the window sills, discoloring the paint there more than any other place about a house.

But there are other factors that are liable to produce the results stated. It is a well-known fact that not only cheap ready-mixed paint, but paste paints, such as yellow ocher, red and black and combination leads, so-called, are ground, in a portion at least, of mineral (petroleum) oil and there is no question but that painters knowingly or unwittingly use sophisticated oil, and they certainly do use substitute turpentines, which invariably contain large portions of petroleum products. It is well known that these substitutes for linseed oil and turpentine, no matter how thoroughly dry the paints made up with them apparently are, cause the paint to become moist in humid weather, and especially after heavy rain; in other words, the paint so made sweats like a green varnish and so becomes a dust and soot collector or plays other deviltries.

—97—

Paint Peeling from the Exterior of a House.

A painter wrote in June: One year ago this month I repainted a house, using pure lead and pure linseed oil. The weather was fine and dry and I used

six gallons of oil to one hundred pounds of lead for the first coat, and allowed ten days before I applied the second or finishing coat, using only one-half pint drier in either coat. After using every precaution, both in mixing and applying the paint, we have this result: A sloughing off of the paint on the east end and north side, where shade trees abound; began in March of this year, and since April it has been discovered that blisters are forming scatteringly under the veranda ceiling, from which, when punctured, a slightly sticky, reddish colored liquid oozes out. The south and west sides of the house are in first-class condition, and other jobs that I have done with the same materials have given the best of satisfaction. Can you tell me the probable cause of the trouble?

The explanation seems to be in the presence of the shade trees and the consequent presence of moisture and absence of sunlight, which did not allow the paint to dry as well in the first place as it did on the other ends. Another cause, however, may be leaky gutters on the roof or moisture from below, i. e., from the foundation, which should be examined into. You should ascertain also whether the peeling does not go clean to the wood, as in that case the old surface was not in a proper condition to be painted. Continuous moisture, without strong light to dry it up from time to time, acts on oil paint of any kind, and the water finally gets in under the paint film and lifts it off. As to the blisters under the veranda ceiling, we believe them to be caused by resinous or sappy wood, the sun burning down upon the veranda roof driving out the sap, which forms the blisters in the paint. It may be argued that this could not take place after repeated paintings, but we have known blisters from this cause to form only after years.

—98—

Repainting House on Which Part of the Old Paint Is Hard and Part Loose.

A painter had a house to paint on which the old paint was on very thick and the surface rather rough. In some places the old paint rubs off, while in other places it is quite hard. How can a good job be made at least expense?

If the paint is not scaly but merely chalky in the places that rub off, we would suggest a thin coat of pure lead, with as much raw oil as possible to stop the chalking or powdering, and when this is dry a finishing coat of the color desired.

—99—

Blistering of Oil Paint on Exposed Surface.

A Pittsburgh, Pa., painter, of over thirty-five years' experience repainted a frame dwelling on which the old paint was somewhat blistered, which he scraped off. On this he applied a coat of oil paint, held fairly flat and then a finishing coat, all raw oil and a little japan for thinners. The job was a first-class one, apparently, but in all his experience he never had any that turned out so badly, for on the west side of the house the paint badly blistered. Several more jobs in the same neighborhood repainted by other parties turned out similarly.

From your description we are satisfied that the blame does not rest on you or on the material that you used. You did perfectly right when you scraped off the old blistered paint and put a nearly flat coat over it and then finished with an all oil paint. We could cite more than fifty instances where oil paints blistered on exposed parts of wooden structures where the paint was burned off repeatedly and whatever pitch there was in the wood was drawn out by the flame of the torch and yet after every repainting matters became worse, the blisters were larger and more numerous. On a rigid examination by an expert builder, one who understands his business thoroughly, it will be found that there is moisture in the wood back of that paint. It may come from a defective gutter in the roof, or from a poor foundation.

—100—

Blistering of Paint on a Dwelling.

The paint on a house that was painted in November blistered. It was given two coats of white lead and oil paint, tinted a pea green tint with chrome green. In the following spring, along the frieze under the porch roofs large blisters appeared, some as large as a grain of corn; others are as large as a man's hand. Some of the blisters appeared on new work, the others on the repainted work, and all are filled with water of a yellow color. The house stands by itself on the river bank, and there has not been any fire near it, but very heavy fogs during the winter. The painter wanted to know the cause of the blistering.

Blistering, as we understand it, is always due to moisture or sap, but can, in many cases, be prevented by carefulness in the application of the paint. A thin and very oily paint, that is not brushed out to the fullest extent, is always liable to blister in the presence of moisture, while on a dry surface it will merely wrinkle or sag. We know that linseed oil is capable of taking up moisture when it has dried to a hard film. Now it stands to reason that in November, on the banks of a river, there is more or less dew, not to say dampness in general, and in order to find out whether the lumber has anything to do with the blistering, you must examine the blisters that formed on the old paint and see whether they extend clean down to the wood or only to the surface of the old paint. If the latter is the case, the failure is due to your material or to unfavorable conditions; if the former, it may be due to local conditions.

—101—

Peculiar Case of Blistering Paint.

A painter had taken a job under peculiar circumstances. It was a house down on Long Island that was being built for an architect. He had specified that the work was to be primed with red lead and linseed oil; second coated with white lead and linseed oil, with no turpentine or driers, but with litharge added. The third and fourth coats were to be white lead and boiled oil, with no turpentine. After the work was primed the original contractor failed, and this painter was called in by the second builder. Four months elapsed between the priming and the second coat, and two or three weeks between each subsequent coat. And before the house was plastered the spaces between the studding were filled in with salt hay. What would be the result of such treatment?

The house would blister from top to bottom. It couldn't help it. The salt hay would absorb moisture from the plaster, and when the hot sun beat on it the salt water would draw through the wood and the paint mixed with boiled oil being elastic would be lifted up in blisters, and this was just what did happen. But the architect insisted that the blistering was due to a mistake of the foreman, who used some turpentine in the second coat on part of the house, although the blistering has extended everywhere, even where no turpentine was used. On pricking the blisters they were found full of water, and the under coats had disintegrated. This was due to the action of the salt. If fresh timothy hay had been used instead of salt hay, the effect would not have been quite so bad, but it was almost like putting a sponge full of salt water back of the paint. The paint would peel off in separate layers. No painter should have touched that house under those specifications unless the architect would first sign a paper agreeing to relieve him from all responsibility, for certainly the work would blister.

The Veteran Painter.

—102—

Cause of Paint Peeling.

A cottage on the St. Lawrence River, which was to be repainted, had the old paint flaking off as shown by samples submitted by the painter who wanted

to know the cause of it and also whether it is not best to remove all the paint before repainting.

The paint must be removed before you attempt to repaint, because the new paint would only assist in loosening all of the films still remaining on the surface. The two coats of paint, one of dark buff color, presumably ocher, the other a dark Venetian red, were evidently applied too stout, and not rubbed out under the brush, as either is heavy enough to make two good coats. Nor was the oil used good pure linseed oil, as an inspection of the buff colored coat shows alligatoring to an unusual degree, while the red paint has not hardened thoroughly.

—103—

Paint Cracking and Peeling.

A house that had been painted with some cheap mixed paint was cracking and peeling all over, although in patches it clung tightly to the wood. Now how would you suggest doing a job like that so as to get the best results and so far as possible to avoid cracks in the future?

I used to meet a good many cases like that. It had been the practice of a good many of the painters in this town to use a cheap second-grade lead—that hadn't a particle of lead in it, and as a consequence, there was cracked paint all over the town. Well, I had a lot of ship scrapers made, of different shapes and sizes to fit the moldings and clapboards, and I would first set my men to work scraping off the old loose paint. After they had finished scraping the loose scale, as well as they could, then I would give the whole house a coat of oil and let it stand two or three days to soak. I would use plenty of oil. That would soften up the old paint so that the men could get to work with their scrapers, and it was astonishing how much more of the old paint we could get off. Then we would paint the house with lead, and I never had a case of cracking—that is unless I used boiled oil. About eighteen or twenty years ago there was a great craze for boiled oil. Everybody wanted it and used it—it was all boiled oil, but every job painted with it alligatored and cracked. So I gave up boiled oil.

The Veteran Painter.

—104—

Glossy Bronze or Bottle Green for Front Doors That Will Not Blister.

From materials usually available to the small town painter, how should he mix and paint a front door a dark bottle or bronze green, so that it will hold its gloss a reasonable length of time and dry free from tack without blistering? A paint made from ocher, umber, blue and black, as bought in one-pound cans, ground in oil of good brands, would not answer, because when mixed with all oil and driers, it remained soft and tacky and blister under slight provocation; when mixed with turps it will go dead. Ready-mixed paint of several of the best brands was tried and was no better.

The simplest thing would be to prime such a front door with a flat coat of white lead tinted with lampblack a medium or dark lead color, that is, use keg lead and thin with turpentine, adding a little drier. If the door is in bad shape, give two coats, and when hard, sandpaper. Get some good bronze or bottle green that is ground in japan, thin with turpentine, and apply with a good flat bristle brush of proper size. Two coats will be best. If two coats are applied add to the mixture for second coat a tablespoonful of good outside or spar varnish to a pint of the thinned color. When the last coat has been on twenty-four hours, give one coat of the best spar or elastic outside varnish, and if necessary for a high lustrous finish, give a second coat of the same varnish three days afterwards. This is a little expensive, but it will give what is desired.

—105—

Flaking of Paint on Frame Dwelling.

A painter wrote: Eighteen months ago I painted a house that was painted before and used the best materials only. Now the paint is flaking off like sample inclosed. The owner blames me because the surface was not blistered before I painted it, but I think the trouble is due to the original priming with ocher some years ago. It is blistered only on the north side.

We think that if you had examined closely the surface before repainting you would have discovered that the old paint was not a good foundation to paint over, as it must have been somewhat loose then. There is no doubt in our mind as to the cause of the flaking or scaling, and it is, as you say, the original ocher priming. Even the finest kind of ocher, when used alone, as a priming coat on exposed wooden surfaces, will produce bad results on repainting. It is the same old story of building a house upon sand. Ocher contains a large portion of silica with clay and oxide of iron, at best a rather brittle material which gives up most of its oil to the wood, leaving the sand and clay almost dry on the surface. This is coated over with a paint usually made of heavier material, a combination of white lead and zinc white, tinted to suit the idea or taste of the owner or tenant. These outer coats expand and contract, as the case may be, and in the latter case they get a grip on the brittle primer and the result is a cleaving of the ocher, as may be noticed whenever the paint scales. On the back of the scale the ocher color will be noticed very plainly, while the wood will also show more or less of the ocher still in the grain. It would save lots of contention and argument between house owners and painters if the latter, before undertaking to repaint, would make a thorough examination of the premises and stipulate that they cannot be held responsible for defects caused by the work of others.

—106—

Permanent Job of Porch Floor Painting.

How would you suggest going about it to make a permanent job of painting a porch floor?

The only way to make a permanent job is to paint the under side of the boards. They ought to have three good coats of paint, just the same as the rest of the house. Of course, they do not get the same wear as the paint on the rest of the house, and so they would not have to be repainted as often—indeed, they might never have to be painted again, but unless it is done once, you must always run the chance of the paint blistering or peeling off.

In the case of an old house, if the owner was willing to pay for it, I would get underneath the stoop and paint the under side of the floor. It is the only way to do a satisfactory job. If your house was built on a sandy soil that will not hold moisture, but will allow it to sink in, there may not be so much difficulty, but where there is a heavy clay soil that will hold the water for days or even weeks, there is no other way to do. When you paint a stoop floor, instead of the ordinary dryer, it is best to use litharge as a drier.

The Veteran Painter.

—107—

Cleaning Off the Old Paint and Repainting a Stoop Deck.

What is the best method to burn off or otherwise remove the old paint from a stoop deck which has been painted quite often, causing the paint to chip in places? Also best way to repaint.

You will find it rather inconvenient to burn off the paint on the floor and may find it more economical to use saponifier or concentrated lye or if the paint is very thick and hard, make a paint remover as follows:

1. Dissolve six pounds of soda ash or caustic soda in two gallons of water in one vessel.

2. Dissolve six pounds of quicklime in two gallons of water in another vessel.

3. Boil two pounds flour in three quarters of water and beat it well into a paste.

Then pour solutions Nos. 1 and 2 into a larger vessel, stir and allow the heat to subside; now add the flour paste and stir well. When the mixture is cold, run through a coarse sieve and apply it, to the thickness of a sixteenth to an eighth of an inch, to the paint with fiber brush, as a bristle or hair brush would be ruined. When the paint is softened, clean down to the wood, scrape it off and wash with clear water, to which you may add some vinegar to neutralize the remaining traces of alkali. When the floor has thoroughly dried, give it a priming of pure white lead and raw oil, colored to suit the desired finish. Give a second coat of pure lead and raw oil, also colored, stouter than the first, adding enough japan to make it dry good and hard. Putty up cracks, if any, with whiting and linseed oil putty, to which some dry white lead has been added by pounding and kneading. This must be done after the priming and before the second coat is applied, and the putty should also be colored to match the paint. For the last and final coat we would suggest a good hard drying floor paint, such as is supplied by reputable paint houses, or if you prefer, make a paint from equal parts white lead and zinc white in oil, thinning the same with best brown japan and turps to painting consistency, adding enough first-class floor varnish to produce good gloss. A floor so prepared will give the best of service on porches or stoop decks.

—108—

White Paint Spotting on Cedar Clapboards.

A painter sent us for inspection a piece of unpainted cedar clapboard, which showed on the dressed side a number of small pustules, some scarcely noticeable, while others were larger than ordinary pinheads. The previous fall he had primed the clapboard sidings, using strictly pure white lead and linseed oil, before the interior of the house was plastered, and during the first half of the following January second-coated the job. On finishing the job, which is pure white, looked well; but early in the summer began to look bad indeed. The house, which is an old one, had an addition built to it and wherever these new clapboards are on the north and east side something seemed to work through the paint which discolored in spots. First a spot the size of a pin, then a brownish discoloration formed downward from the spot for two or three inches as if the roof (which is slate) had been painted with metallic brown and had washed down on the side. The trimmings and old clapboards were all right, or at least appeared so, and the discoloration was visible only on the addition. The little spots showed on the sample. What are they? And what effect would they have on white paint? What is to be done to keep these spots from coming through? Is there any acid in cedar? Could it be some oil or other substance that was sprinkled over the boards at the mill by accident? The party that supplied the lumber and the carpenter that did the work said the boards were all right and that the fault is with the paint.

We had the specimen clapboard examined by an expert, who is of the opinion that it is not an exudation of cedar oil, but that it is more likely so-called mildew, which may have been caused by imperfect kilndrying of the wood or from exposure of lumber in storage. By treating the sample with strong solvents repeatedly he was successful in eliminating the spots entirely, as they did not appear to penetrate deeply into the wood, showing that it was not caused by any oil in the wood itself. That the cause was on the surface of the clapboards and that it must have been due to fungus growth, however small, was established by a microscopical test before the wood was treated with the solvents. The only remedy is to remove the paint as well as the cause of the

spotting or blooming out. That the paint is not at fault is shown by the spots in the sample of clapboard. We assume that you are certain that the discoloration comes from the spots indicated and not from imperfectly puttied nailholes. If so, no one can blame you for the failure of the paint on the new addition. The trimming on the new boards should be examined carefully to discover whether the fault also exists there. The trim color being dark the discoloration would not be so noticeable as on the white.

—109—

Unchanging Blind and Shutter Green.

A Virginia painter says that after trying several brands of chrome green in oil for use on windows and blinds outside, he comes to the conclusion that it is no good for the purpose, as no matter how mixed, it invariably becomes very dark and almost black in the course of from ten to fifteen months' time. He would like to know what brand and quality of green would not have this fault; also how such green should be mixed in order to stand exposure for a longer period.

Not knowing what brands of chrome green you have used, we can not say why your green should have "gone off" in so short a time. We have known some cases where even the very best brands of green were used on blinds and turned out badly streaked in a season's exposure, especially in the very dark shades, but here the trouble could be accounted for by the effect of mortar on the color or the washing down of the rain water, where the shutters, when opened, leaned against rough plastered or stone walls. We can say that it is not necessary that you use a chemically pure green for painting blinds. Any good proprietary brand of green from a reputable manufacturer will stand, under ordinary or normal conditions, for several years. Select a brand of fine grinding, one in which blue separates the least when the green is thinned with turpentine only, and when you have ascertained these two points, thin the green paste by adding, first, a moderate quantity of good drying japan, breaking it up well in this, and then add enough good, heavy bodied kettle boiled oil to make the paint flow freely from the brush, without running on vertical surfaces. Use the paint in this shape on raw wood for first coating; for the finish, however, add one pint spar varnish to seven pints of the paint. To be more explicit, add to 25 pounds of chrome green of medium shade, that can be bought at from 12 to 13 cents per pound at retail, say one-half pint each best brown japan and benzine (not gasoline), and seven pints of boiled oil, and you will have two gallons of blind or shutter green that will not run or sag on the blinds, if you add spar varnish for the last coat, as above. If the wood is very soft, the paint can be thinned very much more than stated for first coating new work, and the finishing coat is benefited thereby—to say nothing of the economy.

—110—

Water Proof Paint for Outside Walls.

Give the walls, when new, an oily priming coat, so as to allow the prime to penetrate well into the wall, be it wood or plaster, brick or stone; let the second coat be as flat as possible, adding a little good outside varnish as a binder, and finish up with a coat of oil paint, to which has been added one pint of outside or spar varnish for every seven pints. Or the walls may be coated with a solution of tungstate of soda as a waterproofing coat and then finished in the regular way with ordinary oil paint. It has been demonstrated quite often that ordinary linseed oil paints are not damp resisting.

—111—

Treatment of a Copper-Sheathed Bay Window.

A residence to be painted red body, ivory trimmings, green shingle roof with a bay window that is copper sheathed. How should this copper be treated to harmonize with the rest of the effect?

The owner certainly does not want the copper hidden by paint, and the best thing is to leave it alone and permit the copper to oxidize naturally by exposure. However, if it is desired to hasten this process, a solution of four ounces of nitrate of iron and four ounces of hyposulphite of soda in one quart of water may be applied as a wash until the desired oxidation has been effected, when it may be rinsed with clear water, allowed to dry and then dry brushed. An antique effect may be obtained by making an oil stain of raw umber, which is applied all over the surface, and when it begins to set, the high lights on the pressed copper are wiped, giving proper shading.

—112—

What Effect Does Green Oil Have on White Lead Paint?

Green oil, when used for thinning white lead for painting, tends to discolor the lead, and unless there is plenty of strong sunlight it remains discolored. Nor will it wear well, and especially in damp weather the paint is liable to peel or wash off in a short space of time.

—113—

Sanding Paint.

Sanding the paint is the worst thing that can be done to a piece of wood or metal. The building soon becomes overloaded with a heavy coat of paint and sand, which holds moisture and rots the wood. You can't burn it off, and in a short time, see where you'll get, for you have to sand every time you paint.

The Veteran Painter.

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Mixing Color Each Day.

No practical painter will thin down enough color to paint a whole house and take the chances of the weather. If he did, it would show he did not know his business, for the color ought to be mixed each day for the day's work. Paint that has been thinned for use with oil will surely grow fatty, although it will keep in the paste form. That's why we tint our colors in the paste and then thin down on the job, just as we need it.

The Veteran Painter.

—115—

Method of Tinting Paint.

The only proper way to tint paint is to do it in the paste. We first thin down a hundred-pound keg of lead with about a gallon of oil, so as to get it thoroughly broken up. Then we add the tinting material in paste form, that you can take out of the cans with a knife. First we get it as near as we possibly can to the color we want, but to get the exact shade it is often necessary to add just the least touch of one or the other of the tinting colors. If you had previously thinned them down, even partially, you would find them much more

difficult to control. But by taking up the paste color on a palette knife it is surprising what delicate gradations of tone are possible. After the color is mixed, then you want to strain it. You cannot thin down the lead first and then color the liquid paint, because the oil is yellow in tone and affects the shade. To make an exact match of the original color, you must do it in paste form. It is an impossibility to thin the color down and match it, or to mix two batches of thinned down color that will be exactly the same shade when painted on the house.

The Veteran Painter.

—116—

Burnt Sienna in Oil as a Paint for Exterior Work.

Burnt sienna of first class quality is one of the most permanent pigments known, so far as permanency of color is concerned. But it is classed among the transparent or semi-transparent pigments, and in order to cover well, it cannot be mixed with as much oil as that sort of pigment should carry in order to hold on to the surface for a very long time. Still, it is not as brittle a pigment as yellow ocher and carries considerably more oil, and therefore may be considered fairly safe and durable for exterior work when mixed with pure raw linseed oil of good body and an elastic dryer.

—117—

Thinning Bronze Green or Other Composite Greens to Make Them Dry with Uniform Gloss.

In thinning bronze green paint many painters experience trouble in having it dry out partly glossy and partly flat when applying two coats only on exterior woodwork, while on three-coat work, where the second coat can be made to dry flat, the third, or finishing, coat will come up with uniform gloss. The question was how bronze green paste should be thinned for the finish in two-coat work where the surface is old and weatherbeaten and an oily paint needed for first coat. Also how much of paste, linseed oil, turps and drier is usually required to make one gallon of this paint.

It depends to a great extent on the composition of the paste bronze green and its consequent bulkiness, as to how much thinners are needed. Pure bronze green paint may be made from drop black, Prussian blue and dark chrome yellow or from drop black and medium chrome yellow alone. Many bronze green paste paints, however, are made from lampblack, commercial chrome greens and yellow ocher or a combination of lampblack, commercial chrome green, clay and barytes. Some few brands are made from very cheap green earth or clay with chrome green and drop black to obtain the desired color. In thinning a pure bronze or bottle green paste, that weighs about $13\frac{1}{2}$ lbs. to the gallon, not over 6 pounds of paste per gallon should be used with $3\frac{1}{2}$ pints of heavy kettle boiled linseed oil of known purity, $\frac{1}{2}$ pint turpentine and $\frac{1}{2}$ pint of coach japan. This will produce one gallon of paint, medium stout consistency, weighing $10\frac{1}{4}$ lbs. As to the first coat on old weathered woodwork, would suggest to use a dark lead colored paint in preference to the bronze green, as this will flat more readily, no matter how oily it is held, and one coat of the bronze green will surely cover over such ground.

—118—

Gray and Olive Tints Spotting and Turning White.

Sometimes gray and olive tints on exposed work show up spotted and turn white, while others made on the same basis do not.

It looks to us as if the trouble might be due to inferiority of the black used. We do not know whether you use ultramarine blue with your gray, and possibly

in your olive also. If the latter be the case, it is easily explained, especially if you use white lead as base for the paints. The United States Navy Department specifies that ultramarine blue must not be used for tinting white lead. The reason for this appears to be that ultramarine is liable to contain some free sulphur, which would tend to blacken white lead by turning it into the black sulphide of lead. Inferior or poorly ground black, however, is the most frequent reason for the trouble mentioned.

In my judgment, there are several reasons that might cause this in addition to the one you gave, that it was due to inferiority of the black or the use of ultramarine in mixing the gray tint. First, it might be due to inferior oil. Second, to inferior lead that has been ground too quickly after it was corroded and not allowed to properly ripen. Third, mixing the tint with dry colors, instead of with colors ground in oil, will cause this spotting. A great many painters are so anxious to save money that they buy dry colors and soak them in oil and then use them for tinting. They cannot possibly make a uniform tint that way, because they cannot break the colors up properly without grinding it. They are saving at the spigot, but they are losing at the bung-hole because of the inferior quality of the work.

The Veteran Painter.

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Most Permanent Pigments for Dark Brown Exterior Oil Paint.

While mineral brown is a good serviceable color for freight car and barn painting, etc., it is not the proper material for a dwelling or residence for several reasons. In the first place, no matter what other pigments may be added, it will not be as rich a color as that made by burnt Turkey umber, not having the warm tone of the latter. In the second place, it will not carry as large a portion of oil as does burnt Turkey umber and is not ground as fine, both of which characteristics will prevent mineral brown from holding its gloss for as long a period. Metallic or iron oxide browns cannot always be depended upon for being free from sulphur compounds, while burnt Turkey umber, ground pure in oil by reputable paint manufacturers, is sure to be free from all deleterious foreign ingredients. If burnt Turkey umber is not deep enough to suit your idea of a dark brown, add sufficient drop or ivory black in oil to deepen the color. Lamp black will deaden the warm tone of burnt umber, therefore we do not suggest its use. Nor do we recommend the use of Vandyke brown, because it is of organic composition chiefly, therefore unstable on exposed surfaces. Browns made by mixing ocher, Indian red and black are dull as compared with Turkey umber.

—120—

What Is the Cause of Linseed Oil Applied on the Outside Losing Its Gloss, Say Within Sixty Days

A large book could be written on this subject alone, and limit of space allows us to mention only a very few of the causes that make linseed oil lose its gloss more rapidly than it should. Chief among them is the inveterate use of liquid or lightning driers or japans and turpentine. Next comes the practice of giving only two coats, where three are required. The too rapid application of the final coat upon the preceding one may also account for the deadening of the gloss.

The use of earthy pigments in old paints causes much of this trouble, but through no particular fault of theirs, rather because their requirements for a liberal allowance of good, heavy bodied oil are not always understood.

When the undercoats are too oily or not dry enough, the next coat of oil paint is liable to sink in or deaden. The same will happen when oil paint is applied to wet surface. Good, heavy-bodied raw linseed oil, to which a moderate quantity of good japan drier is added, or good kettle boiled linseed oil, when

judiciously used with the desired oil colors or white lead, or both combined, on final coat on good hard ground work, will not lose its gloss under ordinary conditions in 60 days, nor in a year. Of course, there are conditions where linseed oil will not stand such as sulphur-laden atmosphere, or where ammonia vapors abound.

—121—

Removing Paint from Blinds and Shutters.

Required to remove paint from outside blinds that are badly alligatored and cracked, having been painted twenty years or more before.

We should advise you to unhinge the blinds, take them to some convenient place and burn off the old paint, which, with the proper lamp and scraper, can be quickly accomplished, leaving a good surface to repaint on. This is the quickest method we know of. Or if you do not care to resort to burning, or to buy one of the many paint removers offered, you may use a strong solution of concentrated lye and water to soften the paint and then scrape it off. In this case you will have to wash the blinds thoroughly, allow them to dry and then sandpaper them, which is quite a job and much more troublesome than the burning-off process.

—122—

Painting Cypress Lumber for Exteriors.

Lumber dealers claim that cypress will hold paint on exposed work equal to white pine, but one painter's experience shows it will not. He uses pure white lead, pure raw linseed oil and as little drier as possible. While on white pine this paint will remain in good condition for five or six years, on cypress the paint invariably scales in from eighteen months to two years.

We quite agree with you, as we have had a very similar experience in several instances. When the cypress wood is thoroughly seasoned, instead of being kiln dried, better results may be looked for and then only when the priming is held less oily than is usually done for white pine. The builder or owner does not care for the protests of the painter, and if he objects too much, the other fellow, who does not object, gets the job. Instead of losing a job on that account, it is policy to make the best of it. See that the wood is at least fairly dry and make a priming of pure white lead in oil, thinned with equal parts of pure raw linseed oil and pure spirits of turpentine, adding to this as little drier as possible, so that the priming will not dry on top only and brush it well into the wood. The paint for the succeeding coat or coats can then be thinned with all oil and drier, and applied stout enough to cover. By following this method, the paint is not so apt to become scaly.

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Blistering and Scaling of Paint on New and Old Work.

In building an extension to a residence, the builder took off some old clapboards that had been painted with four coats of paint, using them along with the new clapboards on the extension. A painter was employed by the owner to give the entire extension two coats of paint. Four weeks later the paint was found to be full of blisters, and the owner refused to make a settlement. On the old clapboards the paint could be taken off in large shreds clear to the bare boards.

The defect you mention can be traced only by a full knowledge of the condition of the surface at the time when you applied your paint. The reason why you were able to take off the paint on the old clapboards in shreds is more readily explained than the cause for your paint blistering on the new part of the work. On examining the scales or shreds of paint you have sent us, we find that

the original priming coat consisted of ocher or nearly all ocher, and invariably, when an ocher priming is applied too heavy or when such priming is fatty, it splits and causes scaling clean to the wood. Now the old paint may have been loose, without being discovered, when you applied your paint or the contraction in the drying of your paint may have loosened the old film, or moisture from inside may have caused it to loosen its hold on the wood. At any rate, it is evident that the old paint had a very poor hold on the boards. As to your paint blistering on the new clapboards the cause may be traced to green lumber or to dampness in the wood caused by rain and thought to be dry enough to paint on, or by the drying out of the plaster striking through, especially when the room is heated to aid in drying the plaster. If you will think awhile, you can most likely remember to which of the causes mentioned the blistering of your paint may be ascribed. If the owner is not satisfied with your explanation, submit it to arbitration, so long as you are certain that it was no fault of yours.

If, however, your paint on the new woodwork has not blistered and is intact, it is very plain that the trouble is due to the old paint on the clapboards, and you are not in any way responsible for the failure.

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Cheap Paint for Rough Shed.

The following recipe has been published for making a cheap paint that looks and wears fairly well on rough or weather-beaten surface:—To a peck of lime, add before slaking three-quarters of strong rock salt brine and two pounds tallow and color with such dry earth colors as yellow ocher, raw or burnt sienna, Venetian red or umber. Remember, however, that the material will dry out three or four shades lighter. Slake the lime with the required color in, let cool and apply with whitewash brushes. The tallow will make the wash waterproof and the salt hardens it.

—125—

Percentage of Humidity Affecting Exterior Painting.

The United States Signal Service designates complete saturation of air with water as humidity—100. That is when humidity reaches 99, rain begins to fall. A painter cannot always wait for days when the humidity is normal, and it is oftentimes necessary for him to add extra driers to his paint during continued humid weather, because drying of paint is very much retarded by moisture. When the humidity as ascertained by the Weather Bureau exceeds 80, we should say that while it is not actually unsafe to paint, the results are far from satisfactory.

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Blistering and Peeling of Paint on Exterior of Frame Building.

A writer had some complaints from customers about paint blistering and peeling from exteriors of houses, where in some places it peeled clean to the wood and where in other places there is fear the old paint will peel and blister after good material is applied over it. Think the trouble is usually due to bad priming and painting when the wood is green or damp.

We fully agree with you, that much of the blistering and peeling is due to green or damp wood and inferior material for priming. The old fashioned notion that anything is good enough for priming is still in the minds of many, but it is like building a house on sand without piling. Boiled or fatty oil has no place in a priming paint for wood nor should a priming be stout. There is nothing better than pure lead and well-settled but not fatty raw linseed oil, mixed fairly thin and without driers for new work, and such prime should be rubbed in well into the dry wood. Over such a priming, paint is not likely to blister or

peel, unless there are some local defects in the surface or behind it, such as plastering in damp weather, leaky gutters on roof, etc. In repainting old painted exterior surfaces as an act of precaution the painter should before he undertakes the job assure himself of the actual condition of the old paint, which may appear to be solid and intact all over and yet, where the new paint has been applied over it for six months or a year, loosen its hold, taking the new paint with it and coming off in large blotches. A tap here and there on the old paint will tell whether it is adhesive and solid or whether it is loose. The new paint cannot penetrate through the old paint and fasten it to the surface; on the contrary in contracting on drying it is liable to draw it away still more from the wood, especially when the priming has been inferior. We would advise you to remove all of the old paint either by burning or scraping.

—127—

Painting a Dwelling with Tuscan Red, Trimmed White.

"I wish to paint a house with pure Tuscan red for the body and trim with white lead. Should I thin the Tuscan red with linseed oil same as I would white lead, and what should be the proportions?"

If the job is one of repainting, we would suggest that you thin the Tuscan red, which, we suppose, you buy ground in oil, as follows:—To ten pounds Tuscan red in oil, after beating the same to an even consistence, add one-half pint of best brown japan, one pint of turpentine and one gallon pure raw linseed oil for the first coat, applying the paint evenly and well brushed out. For the finish, mix in same way, but use only one-half as much turps, but be sure that the first coat has thoroughly dried. If the job is a new one and the wood has not yet been primed, would suggest that you use pure white lead, tinted with lampblack to medium lead color, as a first or priming coat, thinning the tinted lead with five quarts of raw linseed oil and one gill of liquid drier for every twenty-five pounds of the lead. Over this priming, apply your Tuscan red in the same manner as for old work. Not knowing the brand or quality of Tuscan red you propose to use, we cannot give you more explicit directions for thinning. Pure fire-boiled linseed oil might be better for thinning the red for the finish than raw oil on account of holding its gloss longer, but unless you are sure of the oil being fire or kettle boiled you had best stick to the raw oil.

—128—

Painting New Frame Dwelling.

Advice on the painting of a new house. What is best primer to put on the outside? What is best stain for shingles in green and how mixed? The inside walls will be wood pulp plaster. What is best way to paint these walls without using glue size and have an eggshell finish with oil paint? And what color is best for the walls throughout the house when the oak trimmings and floors are finished golden oak?

You have failed to state the nature of the wood used on your house. If cypress, sycamore or yellow (hard) pine, beware of ocher or Venetian red in your primer; but simply thin down pure white lead with raw linseed oil and a little drier. Say fifty pounds pure white lead, two and a half gallons pure raw linseed oil, one pint japan drier, and if you prime in cold weather, add one pint turpentine. This will make about four gallons of priming, which you may stain with lampblack for a lead color, or with small quantity of yellow ocher for buff, according to what color you desire to finish with. For staining the shingles you had best purchase chemically pure chrome green in oil, to which you can add lampblack, burnt or raw umber, also ground in oil, until you obtain the shade desired. Beat these up well and thin with a mixture of one-half creosote oil and one-half kerosene oil and dip the shingles into the resulting paint, allowing them to drain and when laid give a brush coat. Two pounds of the oil color will be sufficient for each gallon of thinner. If you wish to have the

shingles dry within reasonable time, it is best to add about one-half pint of strong brown japan to each gallon of the stain. We do not believe that glue size is absolutely required for wood pulp plaster, but would suggest for first coat, after plaster has well set and dried, a coat of pure lead and zinc paint thinned with raw linseed oil and drier and stained with oil colors to suit finish. Next coat to be half lead and half zinc in oil thinned with equal parts linseed oil and turps, with japan added and colored to suit. The finishing coat to be all zinc in oil thinned with all turpentine and sufficient drier tinted to furnish desired effect. As to the color scheme for the various rooms to go with the golden oak finish trimmings, that depends upon taste and the use the various rooms are intended for. Most any light tints, ivory, cream, sea green, light buff, salmon, fawn or citron will harmonize with golden oak, but blue, drab or gray tints will not.

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Paint Failing to Hold Firm on Yellow Pine and Cypress.

Yellow pine is of very sappy or resinous nature, and wherever direct sun strikes the exposed painted surface it draws the sap, which is bound to throw off the paint unless it is specially prepared to withstand the action of direct sunlight. When the pitch or sap is not plentiful and the wood well seasoned, coating it with shellac varnish before painting will in most cases hold back the sap, but the best precaution is to omit the use of shellac varnish and use instead a priming composed of equal parts by weight of white lead in oil (keg lead) and dry red lead, also pure, beating this mixture up with two parts by measure of pure raw linseed oil and one part pure turpentine, using no drier whatever, as the red lead will act as such. When well mixed strain through a sieve and apply on the same day as it is mixed. Have this priming of the consistency of thin paint and rub well into the wood. If the pink tint given by the red lead is objectionable, add a little lampblack. Mix your next coat stout if made from white lead and oil, but rub it out well.

As for cypress lumber, this is used on cornices and for weather boarding, etc., and there are several varieties with more or less sap, but not like that in yellow or Southern pine. It seems to be more of an oily or greasy nature, but the chief trouble as to throwing off paint appears to be as marked as it is with yellow pine when it comes to severe exposure. We would suggest a similar mixing for the priming coat as that recommended for the yellow pine, with this difference, however, that the white lead in oil and dry red lead mixture be thinned with six parts by measure of raw linseed oil, three parts of turpentine and one part of 90 per cent. coal-tar benzol, holding the paint fairly thin and rubbing it in well. Then follow with stout paint, rubbed out well.

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Applying Linseed Oil Over an Exterior Surface Painted with White Lead and Oil.

It is not advisable to apply a coat of pure linseed oil without pigment over the exterior of a house that has been coated with an extra stout coat of white lead and linseed oil over old paint in scaly condition. The coat of oil will be of no advantage whatever, as it will not penetrate the heavy coating of paint and therefore will not act as a binder or sealer to hold the paint or scales onto the wood. Sooner or later the stout coat of paint will lose its hold and cleave off to the wood, together with the scales, and to apply a coat of oil will be simply a waste of material and time. Old line painters have from time to time suggested that when scaling paint is stubborn and does not yield to the scraper or scratch brush, a coat of raw oil should be applied, when after thirty-six to forty-eight hours the obstinate old paint will yield.

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Painting a House That Never Had Paint on Before.

A painter had a house to paint that had never been painted before. The owner urged the use of white lead and vinegar, instead of lime.

In all our long experience in painting we have never heard of such an idea as the use of vinegar for a medium or binder for paint, either inside or outside, or with any pigment whatsoever. The only reference to the use of vinegar is in its use as a neutralizing wash, when lime or whitewash has been used and the surface is to be coated with kalsomine or oil paint, and it is undesirable to scrape off the lime whitewash or when it is necessary to paint hot plastered walls. Vinegar has no binding properties. We take it for granted that the house referred to had been coated with lime whitewash, and that the owner desires to change to white lead paint and has heard of the use of vinegar to neutralize the old whitewash and keep it from peeling and thus throwing off the oil paint. If this is correct we would use stiff brooms and scrapers to remove as much as possible all the loose whitewash, then give a wash of good vinegar, let it dry and go ahead with such oil paint as you may select.

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Reason for Paint Scaling from a Piazza.

On closely examining the brittle scales offered as samples in this case we find that the original priming coat must have consisted of some very cheap white pigment, being mainly composed of mica or quartz, which is very evident under the microscope and very coarse. This priming appears to have split, part adhering to the wood and part to the back of the green paint scales. This splitting occurs principally on hard lumber, but also on soft, non-porous lumber, especially after repainting repeatedly, the new coats of paint on drying contracting, thus loosening the old brittle coats. This will occur, even on a surface not exposed to the direct sun or weather, and also causes alligatoring, and the proximity of the house to the mill pond has nothing to do with it. It will be best to use the gasoline torch, burning off the paint, but if for reasons of safety the torch is not desirable, the surface should be scraped and wire-brushed. When repainting, use pure white lead in oil, tinted with pure oil colors and thin with pure well settled raw linseed oil, using very little oil drier and pure turps; the latter should be omitted entirely in hot weather. For the finish use any good paint of the desired color.

—133—

Painting Over Old Tacky Surface.

The exterior of a house was painted six years ago, the brick work with Tuscan red and the woodwork a dark green, in both of which fat oil and varnish was used. In sheltered places, where the paint has retained gloss, it is tacky enough to lay gold leaf on, while in exposed places it is quite flat, yet quite soft, and on the mortar joints it is quite glossy. Wanted to know whether any special treatment is required before repainting, as most likely the bricks are to be painted white this time, and to burn the paint off the bricks is out of the question. The woodwork, where most exposed, shows bad cracking and scaling and the paint will be burned off.

We have known Indian red and Tuscan red to act the way described, even when mixed with linseed oil that was not fatty, but this usually happened where the paint was used on iron. The surest remedy would be to remove the paint, but as you say that this is out of the question we cannot suggest anything that we could guarantee to be successful. But unless something is done to harden the old tacky paint before applying new paint the latter will give you all sorts of trouble, such as creeping, crawling and alligatoring. We would suggest that you

should not undertake to do anything during moist or humid weather, but wait until you have had a week of dry weather with plenty of sunshine, then you might do one of two things. Go over the whole surface with a coat of lightning drier (a mixture of strong brown japan and 62-degree benzine), letting this coat dry hard before starting to repaint.

Or make a solution of pure borax in water (two pounds borax to twelve gallons soft water) and go over the surface with this, using a large sponge, applying the new paint as soon as the solution has dried. Try this first as it is least expensive and is a good prevention against crawling, but before going ahead ascertain if the tack in the old paint has disappeared.

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Which Is Most Durable for Exterior Woodwork: Paint Made with Lead Carbonate and Zinc Oxide, or with Basic Lead Sulphate and Zinc Oxide?

Positively to answer this question is most difficult, as there are any number of points to be considered, such as location, conditions of surface, workmanship in application, etc. Also season of the year and especially the carefulness in mixing the paint for the various coats for new or old work. If you have reference to ready prepared paint, then you will have to depend largely upon the claims or assertions of the manufacturer. We should briefly say, that when zinc oxide enters into a lead paint, whether the lead be corroded (carbonate of) lead or sublimed lead, the first or priming coat should not contain zinc oxide for new or unpainted wooden surface, and that in the succeeding coat or coats, the kind of lead used should be selected according to location and surroundings of the building to be painted. For instance on a job in the country where the air is pure and free from gas and smoke, we believe corroded or keg lead with a moderate portion of, say, 20 to 25 per cent. of best American zinc oxide as best, the zinc to keep the lead from premature chalking, while in factory districts and along railroad lines, etc., where sulphur gases are prevalent, we are of the opinion that sublimated lead with a lesser portion of zinc oxide, say 15 to 20 per cent., will give better wear and service, so long as the oil is pure linseed and not over five per cent. of good drier, free from rosin is used.

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Cause of Paint Scaling from Rough Siding Boards.

A. C. K., Pennsylvania, in sending us scales of paint, would like to know cause for scaling. Says the scales are coming off a country house with 6-inch rough siding boards. Scaling is most prominent under the eaves and where the boards lap.

Answer:—The scales are very thick and appear to consist of any number of coats of paint, laid on very heavy. Would say, that the cause of scaling is due to the first coat, which is a mineral red or brown, and the oil it contained was absorbed by the wood and subsequent coats did not supply the deficiency of oil. At any rate, the paint is now without life.

—136—

Some Reasons for Exterior Paint Flatting in Short Time.

A reason wanted for exterior paint going flat after it has dried on the surface in a short time. The paint looked fine, drying with good gloss, but in a few weeks or so the work would go flat in places, showing laps and brush marks, and in some cases, after applying the second coat, it would go that way in a few days.

If every thing about your material is as you state, we can account for this flatting on the theory that the paint has not been mixed or compounded according to the requirements of the surface to which the paint is applied. For instance, on new work, the priming or first coat, when the surface is rather porous, the paint should be held oily enough to give good binding properties and yet contain enough spirits of turpentine to penetrate into the surface and be thoroughly worked out under the brush. It should contain a moderate amount of good japan drier and not dry with more than an eggshell gloss. Must not dry out flashy in spots, but uniformly all over. When the job is to be finished in two coats the second or finish coat should be mixed with good raw linseed oil, very little japan drier and only enough pure gum spirits of turpentine to make it flow freely from the brush without showing laps and brush marks. Should be held fairly stout, but worked out well with good brushes. When the tint is a strong one, a pint of good outside varnish added to each gallon of the paint will be beneficial to hold out the gloss, and at present prices for material will not add to the cost.

If three coat work is permissible, the second coat should be mixed with raw oil, drier and pure turpentine at the rate of five parts oil, one part of drying japan and three parts turpentine by measure, held stout and well brushed out, while the finishing coat should be as suggested for two coat work. The most important point, however, is that each coat is permitted to dry hard before the succeeding one is applied. In painting over old surface see that this is firm and apply a first coat mixed as suggested for the second coat in three coat work and finish with paint mixed as recommended for the second coat in two-coat work. The same suggestions will apply for interior wall painting, where gloss finish is required, whether the walls be new or old.

These are points gathered in actual practice, and unless the ground coats are permitted to dry thoroughly, flashing and flatting of the finish is the inevitable result.

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To Prevent the Creeping of Paint in Cold Weather.

Please advise me what to do to prevent paint from creeping in cold weather and when the first coat has been on the surface for some time. I am troubled a great deal with this and have tried everything I have heard of, but without good results.

Straight linseed oil paint is very apt to creep or crawl in cold weather, which is due to the oil becoming chilled from both the atmosphere and the cold, frosty surface to which it is applied. The only remedy is to add a little turpentine or benzine to the paint, so as to make it work more freely from the brush and to rub it out to the fullest extent. It may take a little more elbow grease in crossing and recrossing, but will prevent trouble in the long run. A little extra drier will also assist in keeping the paint from creeping in cold weather. To prevent paint from creeping on a surface that has been first-coated for a long time give the surface a good dusting and go over it with a sponge, dampened with water, to which has been added a little borax, say a teaspoonful to a gallon. A little potash, say the size of a hazelnut, dissolved in a quart of water and a trifle of this solution stirred into the paint will also keep it from creeping and will not harm the paint to any extent. The creeping of oil paint on surfaces previously painted is often due to grease that has been deposited in some way or other on the old coat, as will, for instance, be the case on the woodwork and plastered walls of kitchens. It is also liable to occur when caustic soda or potash has been used for cleaning off old paint and the surface imperfectly rinsed or neutralized.

Another cause for the creeping may be looked for when the mineral oil has been used in the previous coat or coats of paint.

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Paint Scaling Due to Priming with Ocher.

A frame house, with siding of North Carolina pine, was painted with a well known ready mixed paint and three years after was repainted with the same

paint. It stood for three years, when it began to scale some and the owner wanted it repainted with lead. To the best of the painter's knowledge a combination white lead was used, but after one year the paint came off all over in scales, of which some specimens were sent us, and we were asked how to proceed in repainting to make a lasting job of it.

The scales show very clearly that the cause of scaling is due to the ocher primer, and it is also plainly evident that the ocher was of inferior quality and laid on too heavy. Too much caution cannot be given against the use of ocher for priming Southern pine, especially as the wood is hard and snappy and the priming cannot penetrate when it is coarse. Pure white lead, thinned with raw linseed oil and turpentine, three parts oil to one of turps, is the best prime for Southern pine, and it should be brushed well into the wood. Many craftsmen still cling to the belief that any old thing, fatty oil, paint skins, etc., is good enough for priming. To this fallacy many of the failures in having paint adhere are due. We judge from the condition of the scales that you need not resort to burning off, but that you can remove the loose scale by scarping and brooming. This done, go ahead as suggested and prime the bare wood anew, this time with a thin coat of lead and raw oil and turps, allow the priming ample time to dry hard, then proceed with a paint that is best in your judgment and apply two coats of it, taking care to let the first coat dry hard before finishing.

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The Durability of Paint.

Paint should wear in such a manner that in the course of say anywhere from four to six years, when the owner feels inclined to do so, he may have the property repainted without resorting to burning off or scraping. It should dust or flour off.

Paint should wear about two years or so before it chalks freely. It depends much upon its composition and the proportion of oil it carries. Pure lamp-black, for instance, will not chalk in ten years.

When paint fades its color has lost strength, though it need not necessarily change its tone, the original color has become dim.

Paint should bleach very little, if any, before gloss has left it. The change is generally noticeable only when gloss begins to go.

If paint should chalk or rub off in from three to nine months it shows an utter lack of binder unless ammonia vapors are prevalent in the vicinity.

Rapid chalking of paint need not, of necessity, be due to the presence of white lead, but may be due to driers and volatile thinners in excess, to improper priming of the raw timber or in repainting old work, to the very absorptive condition of the surface.

What colors are best for wear and which are worst on outside work depends largely on the surroundings. In sulphur laden atmospheres the inert mineral colors will wear better than those containing lead or lead bases, while in pure country atmosphere, white and the tints made with black ocher, red oxide, umber, etc., will stand very well. Tuscan red, Venetian red, bronze greens, olive greens, etc., all stand very well. Chrome yellows, golden ochers and imitations of vermilion are apt to go first.

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Application of Oil Paints to Insure Durability.

A journeyman painter asked: What is the best way to apply oil paint on exposed work so as to be reasonably sure of good wear? Are three thin coats better than two heavy coats? One of my shopmates advocates the application of thin coats, while I am in favor of stout paint, brushed out to the utmost.

While thin coats of paint applied so that paint will not sag or run are more sure of giving good and lasting results, because these will dry more thoroughly than a less number of heavy coats carelessly applied, we are of the opinion that a paint just stout enough to flow well from the brush and brushed out well

will give better results in two-coat work than can be had from three coats of thin paint that does not require much elbow grease for application. We know of master painters who have all the paint mixed at the shop, under their own supervision, and do not permit their men to thin down the paint without special permission. This seems to be a safe rule to follow and will insure better workmanship and more uniform results. Of course, much depends on whether the surface is new or old, the condition of new lumber or of the old paint, and the first coat or the priming coat should be more or less oily according to these conditions. If your argument refers to the coats over the priming in new work or to repairing old work, we should say that you have the best of it.

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Oil of Camphor Added to Paint to Drive Away Gnats.

H. C. Stiefel, Ph.D., Chemist for the (Penna.) State Association of Master House Painters and Decorators, writes: You recommend oil of cedar as an addition to paint to keep small flies and gnats away. I think camphor oil will give better results and is also decidedly cheaper, oil of cedar being quoted at 58 cents per pound retail, while ethereal camphor oil is quoted at 20 cents per pound. Camphor oil is very often sold as cedar oil and at cedar oil prices.

Our thanks are due to Dr. Stiefel for calling our attention to camphor oil, though we are uncertain as to the effectiveness of that oil in this connection. When we suggested cedar oil we had in view an article distilled from the wood of the cedar tree in the same manner as wood turpentine is now produced. This cedar wood spirit or oil appeared on the market some ten or twelve years ago, and was then quoted at 60 cents per gallon or about 8½ cents per pound. When placed in a dish where moths were plentiful it drove them away in short order. Spirits of turpentine at that time commanded from 32 to 35 cents per gallon, and this cedar wood spirit not showing any features making it desirable in paint manufacture in general, it did not obtain a foothold. The cedar oil mentioned by Dr. Stiefel and the one we have in view may be identical, and if such be the case those interested should certainly try the cheaper oil of camphor. A small portion of this oil added to oil paint on exterior work will not injure its gloss or durability, nor is it calculated to retard the drying of the paint to any extent.

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Effect of Vines on Paint.

Take the case of vines growing against the side of a house. If they are tacked against the house, when you take them down for the purpose of repainting, you will find that the paint under the vines is much softer and more absorbent and is in such a condition that it will need at least one more coat of paint than the rest of the house. The vine seems to destroy the paint and the fresh paint soaks in and will leave spots that will lose their gloss so quickly that it will take three coats to cover them, if you are giving the house but two coats. Of course, if the vines stand out from the house on trellis, then the paint will be the same back of them as on the rest of the house.

The Veteran Painter.

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To Avoid Injury to Vines in Painting.

It undoubtedly harms vines to have them taken down and laid on the ground while the men are at work. Even if the painting is done in the spring it stunts the growth of the vines. The best time to paint a house that has much shrubbery around it is in the late fall or winter time, though even then people will say that you injure their bushes by throwing snow out of the gutters in

getting ready to paint. You cannot get journeymen to be as careful of the vines as you might be yourself. If people would only train up the vines on lattice-work standing out from the house so that a painter could get behind it, then we could paint all summer, but they won't do that. *The Veteran Painter.*

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White Lead Paint Repeatedly Going Black on Exposed Work.

We have the following from a firm of painters at Wallace, Idaho:—

Would say that our experience would suggest that the primary cause of the paint, turning black comes from priming the house while the panels and posts were water soaked, the primer sealing the surface so as to prevent the moisture from escaping or forcing it toward the inner surface of the panels. By removing one of the affected panels it will be found either spongy and wet, or decayed. There is absolutely no danger of paint turning black or streaked when the surface consists of well-seasoned and dry lumber, and when the primer has been given plenty of time to dry. As a remedy, in this case, would suggest that all the old paint be removed and the wood left bare for two or three weeks, then primed with a mixture of red lead and white lead in oil with a little turps and drier added; giving this coat time to dry hard before applying another, and no more trouble will be experienced.

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White House Darkening by Mildew.

A white house was turning dark. The house is surrounded by trees and shrubbery, and it simply can't help mildewing. And besides that it is near enough to the railroad to catch the wet smoke and soot blown over toward it on drizzly and rainy days when there is an east wind. People blame the paint when the cause is often something else. White is the poorest color that you can use for painting or trimming a house. Dust settles on it and is far more noticeable than on a darker house. Then when a heavy shower comes along the gutter is apt to overflow and carry some of the dirt that has accumulated in the gutter over the edge of the cornice and make the moldings all streaked and grimy. And the same thing happens with the dust that gathers on the water table and the cap moldings over the windows. Some people try to obviate it by painting the inside of the gutter white, but that is of little or no use. The only way to keep a house white is to keep on painting it, and then you get too much paint on and have to burn it off. *The Veteran Painter.*

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Killing Knots in Wood.

Alcohol shellac mixed with red lead will do the work well on inside work; glue size and red lead and gutta percha, dissolved in ether, are also well spoken of. But where the sun's rays have free access, either inside or outside, all these preventatives fall short of the mark. The sun will draw the patch and make it show through paint in spite of all these precautions. Even sizing the knot with oil size and laying a leaf of gold or silver over it has failed in some cases. For fine work, it is best to place a hot iron over the knot, and when a good portion of the sap has come out and been removed by scraping, lay two leafs of gold or silver over it, and this will be found a sure cure.

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Refinishing Oak Doors and Sash.

Take off doors and sash and lay them horizontally in trusses, give them a coat of wood alcohol, which will soften the varnish still remaining. Now take

sharp steel scrapers to remove the softened material and repeat the operation until you get close to the wood.

Now take a solution of oxalic acid, say one-half pound oxalic acid to one pint of water (which, however, will not dissolve all the oxalic acid), and apply it with brush or swab, which will take out of the wood any discoloration, and when dry, sandpaper, dust, refill and finish as you would new work. It is not necessary to treat the wood or wash off the oxalic acid, and though more expensive than the use of ammonia it is a cleaner method and leaves the wood in better condition.

One part of muriatic acid to five parts of water will also remove discoloration from light, hard woods, but in either case the workmen should be very careful in handling the solutions, both being powerful poisons, though oxalic acid is not so injurious to the hands as muriatic acid. The solutions must be made in an earthen or stone vessel and should be carefully labeled and put out of harm's way when not in use.

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Removing Cracked Paint from Exterior Surfaces.

A better method than burning off was wanted for removing paint that had cracked so badly as to show an alligator skin, and in some places inclined to peel and even curl. The house had been painted with two coats of pure lead and linseed oil, but was then in bad condition, having been painted four or five times before with not less than 50 per cent. of zinc oxide in the paint.

You cannot make a lasting job of repainting the house in question unless you remove all of the old paint that is loose or otherwise clean to the wood. And you will find it most economical to use the torch and burn off the paint because in the hands of the skilled man the torch will do the work in less time and with less expense than by employing a paint remover. A good and effective paint remover is all right where the torch cannot be used or where the surface is to be in the natural finish again, but for large surfaces that can be readily got at with the burner, our experience favors the latter plan of procedure.

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White Lead and Oil Paint Blackening, Where Not Exposed to the Direct Sunlight.

A house located on a hill, with no shrubbery within twenty feet, was painted white with good white lead and linseed oil, but turned black on the sides not fully exposed to the sun.

We think the case is not exactly one of blackening, but that the oil has darkened and the paint had no opportunity to bleach out, because of a lack of warmth and light. It may be a case of so-called mildew, or fungus growth, and the best thing to do would be to try a space, rubbing it with a sponge saturated with turpentine, to see if the whiteness can to a certain extent be restored. If not, the best thing to do is, provided the paint is fairly hard, to give it a coat of lead and zinc, in the proportion of two-thirds lead and one-third zinc white.

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Chalking of White Lead and Oil Paint in One Year.

A house was painted with pure white lead and linseed oil, slightly tinted. Six years later it was repainted with two coats of a standard brand of white lead and a crusher's brand of raw oil, tinted green for the body and trimmed in plain white. The surface before repainting was apparently in good condition, but in less than a year the new paint had chalked badly, rubbing off the surface like so much flour.

Did it occur to you before you started repainting last summer to examine the surface critically to see how much oil you should have in your first coat, because of the dried-out old paint that had stood so well for six years? Perhaps all the oil you gave in your first coat was required by the old paint and absorbed by that, and the first coat, being robbed of its oil, in turn absorbed some of the oil that was needed to give the finishing coat a good hold. You do not state the kind and proportion of japan or drier used along with the oil, and this is an important factor. Also last summer and fall were exceedingly dry and hot enough to burn up any paint that carried an excess of drier and an insufficient quantity of oil. Before you lay the blame on the lead or the oil, step around to the north side of the premises and investigate how the paint stood there. If it has not chalked on that side or on the shaded portions of the house, you can figure the cause of the perishing out on the above lines, otherwise the lead or the oil was not as it should have been.

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Priming with Yellow Ocher.

We do not consider yellow ocher the best material for priming new wood-work, because even the best and finest French yellow ocher is at best a brittle pigment. When the priming may stand several weeks or months before second coating, we consider a mixture of equal parts of white lead and finely ground yellow ocher, thinned with pure raw linseed oil only, an excellent priming, when applied thin and well brushed in, especially for soft woods, but for yellow pine and other hard woods we consider a thin wash of pure white lead and raw linseed oil with a little turpentine the only good priming material, especially when the work must be hurried along. Coarse ochers are entirely unfit for priming.

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Cause of the Peeling of Paint on New Spruce Timber.

A Canadian painter wrote that in his locality paint would usually blister and peel in a year when applied to new spruce clapboards, but he has had jobs that stood for several years, due, he believed, to the fact that he usually does not apply paint until after the woodwork had been up for several weeks.

There is not any doubt whatever in our mind but that the blistering and peeling in so short a time is, to a great extent, caused by the condition of the timber to which the paint is applied, yet, while it is a good idea to let the wood go unpainted for a time, we hardly think that a few weeks would be a great help toward seasoning, except in very warm, dry weather. We are rather inclined to believe that the original seasoning of the timber has a great deal to do with the result, but above all, that you are using a better material for priming than the other painters, who have had such poor results. Green wood and moisture are the causes for blistering in oil paints, but poor priming is usually the cause for the flaking or peeling. Boiled oil or fatty oil should never be employed in mixing paint for priming coats, nor should zinc pigments or ocher or other brittle earth paints be used to any extent. Pure white lead with lampblack, or pure white lead with a small portion of fine washed yellow ocher, thinned with pure raw linseed oil, a little turpentine and drier, make the best priming for new spruce clapboards.

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Deadening and Perishing of Oil Paint in Exposed Places.

In the summer, the outside of a frame house that had previously been painted a salmon color was painted pea green, using white lead tinted with imperial green in oil, thinned with boiled oil and turpentine. Four months later the paint could be rubbed off with the hand, except in places where the sun did not strike it.

We believe that, in the first place, the exposed portions of the old painted surface were more dry than were those where the sun did not strike and in consequence absorbed more of the oil from your fresh paint. In the second place, you should not have used any turpentine in repainting old work in summer, as the liquid drier, which you have no doubt used in the paint, has enough volatile oil, such as turps or benzine, in its makeup, and, lastly, your boiled oil may not have been of the best quality. We should advise you to examine conditions of old painted surfaces very critically in the future before beginning repainting, and call your patron's attention to the same when you are not certain of your ability to produce good wearing effects with the specified number of coats. Also to let boiled oil alone, unless you are certain of procuring kettle boiled linseed oil of good body and unquestioned purity. Use pure raw linseed oil instead.

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Proper Proportions of White Lead and Zinc to Insure Good Wear on Exterior Surface.

The opinions of experts vary in this respect, but as the variation of the proportions by those of longest experience and highest reputation among the fraternity are limited between 75 per cent. white lead and 25 per cent. zinc white and 85 per cent. white lead and 15 per cent. zinc white, we may say that a safe proportion in localities named by you would be 80 per cent. pure white lead in oil and 20 per cent. zinc white in oil; while in salt atmosphere, as, for instance, along the seaboard, a combination of two-thirds white lead in oil by weight and one-third zinc white in oil by weight, for all but the priming coat would be proper, the priming coat to be pure white lead in oil only. This, of course, refers to jobs in pure white or delicate tints only. For strong tints, where such a color as yellow ocher, for instance, is used in large proportions, it is unwise to use zinc white at all, because ocher is really a brittle material that will correct any chalking tendency the white lead may have. On the other hand, take a tint like Colonial yellow, that is made from white lead and chrome yellow, 10 to 15 per cent. of zinc white will not be out of proportion. The painter should make his combinations of lead and zinc to suit the tinting colors required to produce the stronger or dark tints, as a great deal really depends upon their properties. It goes without saying, however, that in the chalking of white lead paint and in the cracking or peeling of zinc white paint, the thinners and driers employed exercise quite an important part.

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Painting in Imitation of Granite.

If you wish to imitate the gray granite, have your ground color light gray or light lead. Mix your black and white for spattering with enough turpentine so that they will not run and spatter, first with black, then with white, by striking the brush against a heavy stick, which is held close up to the work. The brush should be stubby and broad, and must not be too full or it will make blotches. This method is much quicker and does not require as much skill as stippling with a sponge, and both colors can be spattered on one after the other without waiting for the first to dry.

To imitate red granite, the ground should be a salmon tint, made from white ocher and Venetian red, while the spatter colors are black, red and white, and are applied as described in the method of imitating the gray granite.

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How to Obtain Verd Antique Effects.

The architects' specifications called for the grille work on the outside of windows and doors to receive two coats of graphite paint, the final finish to be verd antique.

There are two kinds of verd antique effects. One is a term given to a green incrustation on metal, such as brass or copper, which consists of hydrated dicarbonate of copper. The second is a mottled green, serpentine marble, also a green porphyry, called Oriental verd antique.

If the architect in specifying meant the first effect—that is, the imitation of incrustation or patina—the simplest method is to triturate carbonate of copper with sandarac varnish. The iron grille work is first coated with the required coats of graphite, which must not be too glossy, and one coat of dead flat black paint, over which the mixture of carbonate of copper and varnish is applied. When this has dried, it may be second coated in certain places, to make the antique effect more pronounced.

Should the effect desired be that of verd antique marble, the ground must be black as before, and the grain colors white, yellow ocher and bluish green. The tools required are camel's hair fitches, blender and sponge. Large flakes of white are scrambled in with the sponge and blended. Trace in the other tints in veins, large and heavy in regular circles. Blend softly.

The grain colors should be ground in oil and thinned with part turpentine and the necessary drier. To do this work in proper style requires an expert grainer.

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Blistering of Oil Paint After Repeatedly Burning Off and Repainting.

A New Jersey painter had a queer experience with the blistering of certain portions of the surface on the same dwelling. He first painted the house in 1888 with pure lead, French ocher, linseed oil, some turps and a little japan, giving the job three coats. The paint wore well for five and one-half years, with the exception of a little blistering on south side of house under water tables, corner boards and a few weather boards. At that time he burned off the paint and sandpapered the surface, giving it two coats of practically the same paint as he did in the first instance. In 1899 he was obliged to burn off blistered paint at the same places as before, only a little more extended. Two months after repainting, blistering began again in the same spots and also on several other parts of the house. In the summer of 1902, he burned off the paint and again repainted and the blistering became worse than ever. On cutting some of the blisters, fine yellow streaks were found underneath.

From the detailed description given of the mixing of the various coats of paint, and the various brands used, we are satisfied that the material was good and that the blistering was not caused by applying the paint too stout, as is sometimes the case when oil paint blisters afterward. Nor do we believe that it is caused by sap in the wood, as the fine yellow streaks under the blisters may be caused by rusty nails. We are rather inclined to believe that it is caused by moisture behind the weather boards and corner boards, and the moisture may find its way there from imperfection in the roof or from dampness in the ground or foundation. A rigid examination of the roof and gutters, probably the tearing away of a portion of the corner boards and weather boards may reveal the cause of the trouble, for it is hardly probable that after so many burnings off of paint sap would be still retained.

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Keeping Back the Sap in California Pine.

We often find it difficult even to kill the knots in white pine when they are simply touched up with shellac varnish and not more than two coats of paint are applied. No matter how dark the tint may be, the knots will show through as soon as the last coat of paint is fairly dry, especially on southern exposures. In your case, however, it is not so much a question of knots as of sap throughout. We would suggest that you make a priming of equal parts by weight of pure white lead in oil and pure dry red lead, using two parts raw oil and one part

spirits of turpentine for thinning, making the prime rather thin and rubbing it well into the wood. Do not mix more at one time than can be used the same day. Paint placed over this priming is not likely to peel or blister if of fair quality and properly applied. On this lumber, especially, every coat applied over the priming should be applied stout, but brushed out thin.

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Finishing a Porch Floor of Yellow Pine in the Natural.

Put two coats of first-class spar varnish over your priming of boiled oil, turps and japan, allowing at least three days between coats, if weather is fair, but a whole week, if weather is moist and cold. Do not look for anything cheap, but insist on getting the kind of goods that are used on the decks of yachts and, above all, give ample time for drying and hardening between first and second coat.

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Killing Knots and Sap in White Pine.

The most effective and permanent method of killing sap and knots in native or white pine lumber that is used for interior finish before priming coat is applied:—

Unless the knots and sappy places are very pitchy it will be sufficient on interior woodwork to apply bleached shellac varnish to the spots. On outside work, where the sun bears down on the painted surface, shellac varnish does not keep back the sap effectively, and here it is best to add red lead to orange shellac varnish for killing knots, but the work must be done quickly, because the mixture sets very rapidly. In interior work, when the painting is not done in delicate tints, glue size and red lead applied on knots and sappy places will be very effective, but we would favor bleached shellac dissolved in denatured alcohol, not wood alcohol because the latter does not give as good protection against the exudation of the sap. Where the sap appears to be strong two thin coats of the shellac varnish should be applied rather than one stout coat, each coat to be permitted to thoroughly dry and harden before the next coat or the priming is applied. Much of the trouble in having the sap coming through the paint is due to careless application of the shellac varnish and in many cases to inferior quality of the latter. Where color does not cut any figure it is best to employ orange shellac dissolved in denatured alcohol. In very choice or expensive work it is recommended to size knots with oil size and lay gold or silver leaf over it. Aluminum leaf will serve the same purpose, but, as said before, in most interior work, where there is no strong exposure to sunlight, the sizing with shellac spirit varnish will be sufficiently effective.

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Exterior Paint to Imitate Old Copper.

To obtain the very old copper effect, mix two parts by weight of lampblack in oil with three parts medium chrome yellow in oil and seven parts Venetian red in oil. Thin this mixture with a vehicle made from four parts by measure of raw linseed oil, one part liquid drier and one part turpentine, so as to dry after application with semi-gloss, as it should not show high-gloss finish. According to the effect to be imitated, a small portion of white lead may be added.

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Apparent Rapid Disintegration of White Lead Paint.

The exterior of a house that was painted before a light pea green body and dark bronze green trimming received two good coats of pure white lead, thinned with pure linseed oil and turpentine. When the job was finished it looked fine and all right in every way, but now, after about nine months, it looks as if it had been done five or more years ago. Looks streaked, full of brush marks, shows nail holes and more like a priming coat and dead flat.

The brand of white lead you mention as having used in painting the house in question is considered one of the best and we would not lay the blame on that. Experiences such as you have had are not rare, but happen rather frequently and the term for the occurrence is what painters call "chalking," or powdering of the pigment, that sets in sooner or later when the medium or binder has been destroyed by some cause or another. This may be due to the white lead not being washed properly before grinding in oil, or to oil from green seed or to linseed oil that has not been thoroughly washed after treating with oil of vitriol in refining or bleaching, or to an excess of inferior driers, to an excess of turpentine or turpentine substitutes. And last, but not least, it may be due to the composition and condition of the old paint. You say that in this case the old paint was only on the house eighteen months, and that it was in good condition, apparently, all of which we do not doubt. But we have frequently noticed the very conditions described by you, where white paint had been applied over light and dark composition greens. The most plausible explanation of the early disintegration of your paint is that the pea green body color contained a good portion of ocher and combination white and the bronze green trimming color also contained much ocher and other inert material, and while you may have taken it to be in good condition, because it was not cracked or had not washed off, it was there in a pretty dry and brittle form, making a good ground for repainting, but with great avidity absorbing the thinners from your white paint, finally leaving it dry on top, the sun and heat doing the rest, when the finishing coat was unable to stand being washed off by the rain. You failed to state conditions of the paint on sides of house not directly affected by the sun. Look these over and it may give you an idea as to whether our theory is the correct one.

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Shellacing Knots on the Exterior of Woodwork.

Shellac varnish is employed, among many other uses, for coating knots and sappy places in pine lumber previous to applying paint, in order to hold back the sap exuding therefrom under exposure to sunlight. Unless this is done properly and with a good grade of shellac varnish, the discoloration caused by the exudation will show through two, three and even four coats of paint, especially light colors and tints.

It is best to use white shellac varnish wherever white or delicately tinted paints are applied. Shellac varnish is made by dissolving gumlac in spirit of wine for the best grade, but since the tax on denatured alcohol has been removed the gum is dissolved in either denatured grain alcohol or wood alcohol. For delicate work the bleached gum shellac is preferred, and the solution is known to the trade as white or bleached shellac. For work where color does not cut any figure, orange shellac is preferred, because somewhat lower in price and more tenacious in wear. For still more common work brown shellac is employed. When shellac varnish is applied to large surfaces it must be worked diligently over the same, otherwise there will be bad laps.

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Ivory Tinted Lead and Oil Paint Streaking.

Several houses are painted a deep ivory color made from white lead in oil, tinted with raw sienna and pure chrome yellow thinned with pure linseed oil and

the usual portion of drier. On the east side of these houses where storms always hit, there are black streaks all the way down as if black water had come down from the roof, while on the west side that is exposed to the sun the paint appears all right and clean.

The brand of white lead you mentioned is strictly pure, and we can say the same of the linseed oil if you have purchased from the crusher direct, or at least in the original package. The use of a portion of zinc oxide with white lead corrects tendency to chalk, but it should not exceed 25 per cent. of the total pigment in the paint. Such a portion of zinc, with white lead also tends to produce cleaner tints and prevent early darkening of tints. As to the actual cause of the black streaks on the east side of the houses in question, we incline to the belief that the trouble is not due to the paint itself at all, but to local cause. Have you considered the surroundings on that side of the houses? Is there any swamp near at hand? Any shade trees close to the houses? Or any railroad near enough for smoke to reach them? We have had quite a number of storms of late. If the chrome yellow was really at fault or the white lead or the oil, the streaks would appear on the sunny side of the houses as well.

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Hastening the Drying of Vandyke Brown.

Am painting the exterior of a dwelling where owner insists on Vandyke brown for trimming and my paint will not dry, although I am using a good strong drier. Requires about seventy-two hours before the paint starts to set. Will you tell me what I can do to make the brown dry on second coat, as owner will not have anything else?

Vandyke brown or cassel earth, sometimes called Cologne earth, is one of the most difficult pigments in oil to make dry within reasonable time. To this characteristic is due the fact that it is not in favor as an oil paint and that it is now used only in stains and distemper work. Its non-drying nature is due to its being of organic origin, a mixture of peaty substance (decayed vegetable matter) and earth. While it is almost indispensable to the glazier on account of its deep rich brown tone, it does not stand well as a paint or in a tint on exposed surfaces. As to your case, we do not know what kind of oil or vehicle the paste you used was ground in or what strength your drier had, but we do know that Vandyke brown should be ground in kettle boiled linseed oil and that when so ground and is thinned with pure raw linseed oil and a moderate quantity of a basic drier it should set in most any condition of weather in twenty-four hours and be dry in thirty-six hours. Only in warm dry weather quicker drying may be expected, even when the vehicles used are as stated. As it is, we can only suggest that you take, say, four ounces of pure dry red lead and mix same with only enough oil to make a thick batter, which add to, say, one pint of your brown paint, stirring well and running the mixture through a strainer, applying the paint within twenty-four hours to the surface. If your Vandyke brown is full strength the red lead will not visibly affect or change the color.

—166—

Repainting Burnt Off Exterior Woodwork.

After burning off the paint from the outside of a frame house and sanding the burnt spots well would you advise to touch up with shellac varnish before applying a white lead paint, or will white lead paint wear longer if applied directly to the burnt spots?

We see no reason why the scorched portions of the surface should be touched up with shellac, as the pitch, if there was any in the wood, should be well drawn out by the burning. In our opinion, by applying the paint directly on the surface without any shellac, it will be absorbed to some extent by the wood and become more adhesive and wear better in the long run. If the job is to be in white it will be best in order to save in the number of coats required to make the first coat a light lead color by tinting the white with a little lampblack.

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Red and Green Paint for Sea Buoys.

Best pigment for green paint and what for red paint to be used in coating buoys to be located in salt water.

As the question of first cost should not enter into a paint of so much importance we unreservedly would suggest the use of chromium oxide green because it is very light proof and of great resisting power against sea water. This cannot be said of the so-called chrome greens, which are merely combinations of lead chromates and Prussian blue, because the lead chromate will in time be affected by the salt water.

For the pigment for the red paint we should avoid the use of chrome red or any of the bright reds that are based on lead products of any description because the constant contact with the salt in the sea water must eventually change the lead base into lead chloride through which the red color will suffer and lose its identity.

A red of the paranitraniline group with a base of blanc fixe free from all lead salts and of sufficiently high percentage of the dyestuff seems to us the very best pigment for the purpose.

As for the vehicle, in either case, for green or red, we should for the finishing coat prefer a high grade of so-called spar varnish, that is, a varnish made from linseed oil and the hardest gum it is possible to obtain, fossil amber being the ideal for that purpose. The ground coats for the buoys should be of the non-corrosive type for metal.

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Good Varnish for Wooden Patterns.

Pattern varnishes are to be classed under the heading of spirit varnishes or lacquers. There are clear or transparent varnishes and colored pattern varnishes, the latter being generally only in orange yellow, red or black. The requirements for a good pattern varnish are, first, a mirrorlike gloss, and second, great hardness and durability, so that the pattern may serve its purpose as long as possible. In order to accomplish the latter, it is necessary to select, aside from shellac, only such resins as will give the required toughness and hardness of surface. It is self-evident that only such resins as are spirit soluble can be considered in this connection. The best pattern varnish consists of shellac, dissolved in pure grain alcohol, but owing to the tax on this commodity denatured grain or wood alcohol is mostly employed. But there are many pattern varnishes that contain but a small portion or no shellac at all, as will be seen by the following formulas:—

I. Fifty parts, by weight, of orange shellac and twenty-five parts of powdered kauri gum are dissolved in 165 parts denatured grain alcohol in a steam bath. This makes a deep orange colored pattern varnish of very good quality.

II. Twenty parts, by weight, of orange shellac, ten parts of red gum accroides and ten parts of yellow gum accroides are dissolved in 100 parts denatured grain alcohol in a steam or hot water bath. This produces a fair grade of pattern varnish also dark orange in color.

III. Fifteen parts gum sandarac, fifteen parts red gum accroides, twenty parts kauri gum and one part gum elemi are dissolved in seventy parts of denatured grain alcohol in a steam or hot water bath. This will also produce a fairly good grade of pattern varnish.

When it becomes necessary to make pattern varnishes at still lower cost, ordinary rosin of the proper color or grade may be in part substituted for the kauri gum or gum accroides in the formulas given, but it is not worth while to substitute wood spirit for the denatured spirit, as the latter is actually lower in price than the former and is not so obnoxious to the workmen. All these varnishes, no matter by what formula they are made, must be filtered to remove

the impurities in the resins or gums, and a few thicknesses of cheesecloth will answer if no other filtering apparatus is at hand. Colored pattern varnishes are not expected to stain the wood only, but should cover it solidly. Hence it is necessary to have an intimate mixture of the body color and the varnish. For the black, lampblack or ivory black should be triturated in alcohol, and when well softened part of the varnish beaten into it, and this mixture added to the balance. For the red, extra fine bright oxide of iron red treated in similar manner will usually answer.

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Painting the Cupola of a Tower in Imitation of Oxidized Copper.

There are several ways to accomplish this. But in either case, it is absolutely necessary to prepare the sheet zinc by removing the grease which is always present on this metal and by roughening the surface in order to make the paint hold indefinitely. This is best accomplished by dissolving in one-half gallon of soft water, one ounce each of copper chloride, copper nitrate and sal ammoniac. The solution must be made in a glass or earthenware jar and when the chemicals are dissolved, one ounce of commercial hydrochloric acid is added. This solution is applied to the metal with a wide, soft bristle brush and allowed to dry thereon, which will take place over night. The metal will turn black while wet, but on drying will assume a light gray color which should be dusted before any paint is applied. The method followed in Russia, where nearly all the roofs of churches and their towers are of sheet zinc, tin or sheet iron, is to mix five parts by weight of pure white lead ground in oil, two parts by weight of paris green in oil, thinning to heavy brushing consistency with boiled linseed oil, using no drier. The longer this paint is exposed the more it looks like copper patina, but on roofs where the tin or zinc has been stamped in patterns a blending of the green with a glaze of raw umber will make the imitation more perfect. Of course the high lights must not be touched by the glaze. This paint is extremely durable, at least in the climate of Russia.

Another method is to prime the prepared metal surface with a ground that comes closer to dull copper. This may be made with pure white lead in oil, tinted to any shade between dark yellow and dark brown, as fancy dictates, using deep orange chrome yellow and burnt Turkey umber to produce the desired ground color. It is best to apply two coats of this ground and avoid having it too oily. The high lights are then put in with zinc green or oxide of chromium green ground in oil, using the brush in a pouncing manner. As a final safeguard a finishing coat of highest grade of spar or outside varnish is recommended, but in this case the ground color, as well as the green for the high lights, should be of semi-flat or egg shell gloss nature. The artistic appearance of this imitation of copper patina will depend largely upon the taste and skill of the operator. The application of copper bronze and a subsequent treatment with a solution of carbonate of ammonia has also been suggested, but we doubt its utility.

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Imitating Oxidized Copper for Store Front.

To imitate oxidized copper (green patina) on a wooden surface a special treatment of the surface, as in the case of metal, is not required. But in order to make a durable job a good ground is necessary. If the wood is new or unpainted the first coat should be pure white lead, tinted with burnt rubber and medium chrome yellow, thinned with a mixture of 4 parts raw oil, 2 parts turpentine and 1 part brown japan, if the wood is of the hard variety, such as cypress or Southern pine or oak. If of whitewood or soft pine, less turpentine and more oil should be used in the thinning. If the surface has been painted and is in fair condition it should be sandpapered and given a coat of pure white lead, tinted as stated for new wood to a light brown, with burnt umber and medium chrome yellow, thinned with equal parts raw linseed oil and turpentine with some drier

added, so as to make this coat of paint dry semi-flat. Over this ground, whether the surface is new or has been painted, a coat of color is applied, mixed from medium or orange chrome yellow in oil and burnt Turkey umber in oil, to a deep brown, that has a somewhat yellow undertone. As the surface should be finished with a coat of high-grade spar varnish, for protection, this coat should dry with a gloss no higher than eggshell, hence in the thinning of this color very little oil, if any, should be introduced, the thinness to be a mixture of about three parts turpentine to one part of a good quality of japan. When this coat has dried good and hard the effect of oxidized copper can be produced by the use of a green bronze in a good bronzing liquid, applying it in a blending way with a soft pencil, so that the dark brown ground will not be obscured. This, of course, requires skillful handling. A still better way, that produces a more permanent job is to use oxide of chromium green (guinet green, sold in artists's tubes as emeraude green in oil) or zinc green in oil, as a glaze, but this also must be mixed with turpentine and drier to prevent too high a gloss. In any case, as stated before, the surface so treated requires protection against atmospheric conditions by the application of a very high grade of outside or spar varnish.

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Finishing White Pine in the Natural.

A coat of bleached or white shellac varnish, followed by light sandpapering and finishing with extra pale varnish, should produce an excellent job on a surface of selected white pine. However, on most jobs in the States a so-called liquid wood filler or shellac substitute is applied to the bare wood, followed by low-priced interior varnish or pale hard oil.

—172—

Preventing Coal Tar Paint from Striking Through Oil Paint.

What will keep coal tar paint from coming through subsequent coatings of lead and linseed oil paint? The tar paint in question had run down on the side of a dwelling from the roof and penetrated through the paint into the wood. When the house was last painted the old paint was burnt off, but the tar still struck through.

Treat the spots or patch of surface where the tar paint has penetrated as you would in killing knots or sappy places in pine; that is, apply at least one or, if necessary, two coats of orange or brown shellac varnish before repainting with oil paint. This may appear a trifle expensive, but wood alcohol or denatured alcohol shellac is not prohibitive in cost and it goes a good way. As the spirit evaporates, a coating or film of hard gum is left on the surface, through which tar cannot penetrate.

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The Effect of Mineral Oil in Outside Paint.

What effect has the addition of mineral oils that are usually sold at a low figure as paint oil or putty oil on paint, when used for exterior work, such as frame dwellings and the better class of barns, etc. To what extent can such mineral oils be used with linseed oil paint without being harmful?

As is well known, mineral oil, or as we would more properly term what is being used as paint oil, petroleum, is the more or less refined form of "crude oil" and has absolutely no oxidizing or drying properties, at least not in the sense that the practical painter is accustomed to.

Mineral oil becomes viscid on long exposure, but does not actually dry hard. When mixed with linseed oil or other drying oils it will retard their drying to the extent of such addition. For instance, when five per cent. of well refined mineral oil is mixed with ninety-five per cent. of raw linseed oil, the difference

is not noticeable to any extent, but raised to ten per cent. the addition will retard the hardening of the oil film at least forty-eight hours and the resulting film, when finally hard, apparently exhibits a bloom, while to the touch there is a sort of greasiness, similar to that which is noticed when varnish sweats out under certain conditions of the atmosphere. When a mixture of raw linseed oil and mineral oil in equal portions by volume is made and flowed on a slab of glass and permitted to drain, the film made by the liquid remaining on the glass will, in a well ventilated room in a temperature of eighty degrees Fahrenheit, dry superficially in fifteen to twenty days, but the film will be found soft and greasy and yet brittle and without tenacity. When mineral oil is added to raw or boiled linseed oil in quantities of over ten per cent., it will happen that, when a film of such mixture has dried fairly hard, there are here and there, over the surface, spots of bloom, which indicate that there has been a separation of the mineral oil during the drying of the linseed oil and on examination it will be found that the film at these spots is much softer than elsewhere. When such mixtures of linseed oil and mineral oil are used as vehicle for paint with the pigments for exterior painting and the paint is well mixed, the sweating out or blooming will appear only when the mineral oil is used in excessive proportions, but it stands to reason that, in order to make such a paint dry within reasonable time, an excessive percentage of drier is necessarily incorporated, a feature that does not benefit the wear and durability of the paint. While mineral oil has its uses, exterior paint of the character you have mentioned is best without it.

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Effect of Heavy Frost on Fresh Oil Paint.

What effect does freezing weather or heavy frosts have on fresh paint?

We should say that any linseed oil paint, when the temperature is at the freezing point or below that, is apt to dry very slow unless more drier than usual is added, besides some volatile thinner, such as turpentine or benzine, in order to make it flow evenly and freely. Even then it is liable to creep or crawl, due to the partial congealing of the oil from the cold atmosphere. It is evident that when the paint creeps or crawls the surface is not covered uniformly and therefore the paint does not give the protection it otherwise would. On the other hand, if sufficient drier and volatile thinners are added to an oil paint to prevent crawling in cold weather, it stands to reason that the life of the paint will suffer to some extent. This applies to paint in general, especially on metal surfaces, where there is no penetration, as is the case with wood. As to a special case of coating steel girders with red lead, we would say that it depends a great deal upon the condition of the metal at the time of applying the coating, and also whether the red lead is pure and mixed with raw linseed oil shortly before application, so that there was no oxidizing action. If the metal is dry when the red lead is applied and the material mixed as stated above, the heavy frosts at night will not seriously affect the lasting and protective quality of the coating, but as a matter of course will considerably delay its drying. Red lead, because of its heavy specific gravity, will, when pure, lie close to the metal, thus keeping out moisture and air.

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Causes for Cracking of Painted Surfaces.

What are the general causes for the cracking of painted surfaces, and whether it is possible to detect the cause by the effect?

The causes for the cracking of paint are manifold. The most common cause was the use of boiled oil in priming that was in vogue some years ago. Priming with cheap ocher or cheap white lead, so called, that had not a trace of white lead in it, was another cause. Unseasoned or poorly dried lumber used in buildings is another reason for the cracking of paint. This refers to outside painting mostly. On interior work the cracking of paint is due mostly to the kiln-dried

or green lumber, to green or hot walls, inferior size or imperfectly dried undercoats, always providing that the finishing paint is properly made and well balanced for the purpose. As to determining the cause from the effect, we would say that when paint cracks with appearance of an alligator skin it may be assumed that the wood may have been green or the undercoat not hard enough, or if in a wall, the sizing was imperfect, even if apparently hard to the touch, or that the wall was too hot for sizing and painting. This effect will show in deep ridges, or rather furrows. Fire cracks are of a different nature. These appear in spots only, and extend from this spot in fine lines in all directions, similar to the crack in a glass or mirror that has been struck by a pebble or bullet. These cracks are due to contraction of the finishing coat, brought on either by excessive temperature or inelasticity in the material itself. When a plastered wall such as, for instance, in a kitchen or in a laundry, is repainted without being first washed down with soap and water and thoroughly rinsed, and shows, after painting, large furrows in the new paint, it is not necessarily the fault of the paint, but the grease on the wall, that does not permit the new coating to obtain a proper hold on all of the surface. A very large volume could be written without exhausting the subject.

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Should Wooden Water Tanks on Roofs Be Painted?

By all means the outside of such tanks should be kept well painted, especially the hoops or bands. When such tanks are set up the owner should specify that the bands are to be coated on the inside with pure red lead in oil, omitting use of drier, but adding enough turpentine to make the paint set well and lay close to the metal. The same protective priming of red lead should apply to the bands when tanks are set up and about to be painted. No matter what paint is used for the woodwork the bands are best primed as above and finished with a glossy black. The bottoms of the tanks are best left unpainted, which also applies to the inside of the tank for obvious reasons. Gray and moss green paint are the colors most favored for tanks of this class. The frame work on which the tanks rest should of course also be painted to protect it from the weather.

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Mixing Black Paint for Store Fronts.

Drop black in oil is a most difficult material to depend upon as to drying properties, and simply mixing it with outside or 'spar' varnish alone will not permit it to be spread in a film thin enough to dry through within reasonable time. There are several ways to repaint an old surface in black, but none of these will give good and lasting results unless the following method is adopted:— If the old paint is blistered or not firm scrape or burn it off. If still solid and firm sandpaper it, and in any case give it a good coat of pure white lead in oil, tinted with lampblack in oil to a dark lead color, and thin with equal parts of raw linseed oil and pure turpentine adding a small portion of good japan drier. On this foundation apply any one of the following black paints: Thin sign writers' black with a mixture of five pints pure raw linseed oil, one pint pure gum spirits of turpentine and two pints best japan to a consistency just sufficient to well cover the lead-colored ground coat. Or, if there is no objection to the somewhat gray hue of lampblack, thin pure lampblack ground in oil in a similar way. When high gloss finish is desired either of the above blacks may be gone over with a coat of high-grade spar or outside varnish after the paint has been exposed for a few weeks. Still another, though more expensive method, is to apply, over the lead-colored groundwork, drop black ground in japan that has been thinned for use with pure spirits of turpentine, and to each quart of which has been added one-quarter pint of good outside varnish in order to make the color flow freely and give it some elasticity. To produce a high gloss effect in jet black finish with a coat of best outside or spar varnish.

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Preventing the Creeping or Crawling of Paint.

Oil paint is always apt to crawl more or less during cold or freezing temperature. A moderate addition of turpentine or benzine is decidedly helpful, and when the paint is laid off and brushed out well there should be no trouble. However, when the surface has been coated before and is somewhat glossy, it should be well dusted and rubbed over with a sponge moistened with water, to which a little borax has been added, say one tablespoonful to a gallon of water. A little potash, the size of a hazel nut, dissolved in a quart of water and a few tablespoonfuls stirred into a half gallon of the paint will also prevent it from crawling and will not harm the paint.

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Cause of Paint Shriveling on Drying.

If we are to assume that the paint showed only a shriveled and flat appearance on the side of pillars facing outward from the house, it would indicate that the paint dried in good shape on the sheltered portion, while on the opposite side there must have been some atmospheric disturbance that caused the paint to chill while setting. Whether we understand your remarks correctly or not, so long as the paint was properly brushed out, it should not have silked or shriveled, had it not been for the fact that you added spar varnish in addition to japan drier. You may differ with us, but we do not consider it good practice to add spar varnish to any paint that contains an appreciable portion of white lead. It is quite common to add spar varnish to deep greens, browns or reds used in trimming to give more binder and more luster, but varnish added to oil paint made of white lead does not work well and is apt to flatten rather than to enhance gloss. Shriveling or silking always produces flatting in paint or varnish.

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Keeping Insects Away from Fresh Paint.

We have used oil of cedar successfully in that connection, but have had no experience on oil of citronella. Oil or spirit of cedar is very similar to spirits of turpentine, but does not evaporate as quickly. It has a very pungent odor that kills moths when it is set in shallow dishes in rooms where moths have gotten into carpets, rugs, etc. As much as one-half pint, even a little more, to a gallon of paint, replacing the spirits of turpentine, will not harm the durability of outside paint, and we should think oil of citronella, if not used in excess of one-half pint to one gallon of paint, would prove as effective and harmless, both being essential oils.

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Why Zinc White Paint Scales on Exposed Surfaces.

Why a paint made from pure zinc white is not durable on exposure and why it cracks and scales, often in a short space of time:—

The explanation is as follows:—Zinc white is oxide of zinc, and, under the influence of the carbonic acid in the air combined with moisture, zinc oxide undergoes a chemical change into zinc carbonate, which change brings about an increase in volume, zinc carbonate being lighter in specific gravity than zinc oxide. This change, then, is the cause of the cracking and scaling of zinc paint. In the case of white lead—that is basic carbonate of lead, this cannot take place because this pigment is unaffected by the carbonic acid of the air.

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Asphaltum and White Lead on Exterior Work.

Asphaltum mixed with white lead will hold the tint produced for any length of time only when it is specially selected and treated. The ordinary asphaltum of commerce is unfit for such purpose, as it may be mixed with coal-tar products, and even if not so mixed it may be one of the liquid or semi-solid sort, containing too great a percentage of hydrocarbons (similar to paraffine) that turn gray, crack or scale from the effect of exposure. Egyptian or Syrian asphaltum is first subjected to heat at a temperature of say 480 degrees F., after it is crushed to coarse powder. After thus roasting the material it should be ground in spirits of turpentine, or, still better, a mixture of two parts by volume of borate of manganese (siccated) linseed oil and one part turpentine. When so selected and prepared, asphaltum is entirely safe to be mixed with white lead or any other dense pigment.

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Keeping Gnats Away from Fresh Paint.

Some of the essential oils, as, for instance, oil of pennyroyal, which is very penetrating, would most likely do the trick, but it is too expensive. Ethereal camphor oil is not very expensive, and by adding one-half pound to a gallon of paint the odor will be strong enough to keep the gnats away, and the addition will not subdue the gloss of the paint nor retard its drying to any extent. Oil of myrbane is also distasteful to the insects, so is oil of cedar, but these would be apt to flatten the paint somewhat, besides being more expensive.

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Blistering of Paint Applied to Burnt Off and Old Painted Surfaces.

If all of the paint where the blistering has taken place is of the same composition in its vehicle portion as that used in the sample scale you enclosed with your letter, an answer can readily be given. The scale shows the paint to have been of a very deep shade of bronze-green, and the paint film representing the blistered paint is very firm and non-porous. We have a very strong suspicion that the vehicle in this paint consisted in its major portion of varnish, because linseed oil paint, no matter how made or prepared, will never on drying or hardening produce such a hard, glossy finish as is in evidence here. Now it stands to reason that in your Texas climate the sun gets in its work on paint, and if there is any moisture behind it and this cannot be drawn out through a non-porous film, a blister is the result wherever the moisture or the sap from the lumber has been collected by the generated heat. Blistering of paint is usually traceable to green lumber, moisture in the surface; impure oil, linseed oil containing excessive portions of foots, or to paint being applied too stout. This last cause for making blisters on paint is most frequently noted, and may be noticed on many signs that are painted white or yellow and are cut in with one coat only of black or dark green held very stout for a one-coat job. When boiled oil or varnish is used here, blistering on exposure to sunlight invariably takes place. As to the use of a non-drying renovator, whatever this may be composed of, if it is of a greasy nature and not removed before painting over the old surface, it may produce trouble in blistering.

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Scaling of Paint on Window Sashes and Porch Risers.

The exterior of a residence was painted with strictly pure lead, raw linseed oil and a little turpentine. Was painted twice before, and the old paint appeared to be in good condition. Why does the paint now cleave or scale clean to the

wood on the sash and the porch risers, while it is firm on the balance of the woodwork?

We believe the trouble is with the priming. It may be doubted that this is correct, because the paint did not scale all over; but then it must be remembered that sash and doorwork is generally primed at the mill to keep the wood from warping. This is done by dipping in a mixture of the cheapest kind, and the consequence is that subsequent paint coatings do not obtain a good, firm hold on the wood. Both window sashes and porch risers are more exposed to snow and rain as well as to the heat of the sun than any other part of a dwelling, and if the priming was not first class originally the painter cannot be held responsible for failure in repainting.

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Paint Flaking Through Ocher Priming.

This was only one more of the numerous cases that are called to our attention every year, where the paint scales or flakes off clean down to the bare wood. In almost every instance, it is traceable to the original priming with yellow ocher, which some years ago was considered the best practice in painting frame buildings. In the case of Southern or yellow pine and cypress siding this happens most frequently, while on white pine siding it is more rare, although here, too, scaling will occur after several repaintings.

It is an established fact that ocher, no matter how finely ground it may be, is at best a brittle earth pigment, that does not penetrate with the oil into the pores and fibre of the wood or even if it does, it does so only partially, and, to use a popular term, the coating splits, part of the pigment being found on the wood and the other portion on the back of the scales of paint that has flaked after one or more repaintings.

The less the care in brushing the priming paint into the wood and the less seasoning the lumber underwent, the sooner flaking will take place. Also in many cases there was a theory with some painters that anything was good enough for priming and much yellow ocher was used for the purpose that had been doped with all sorts of cheap material of heavy gravity to economize in the quantity of oil. It is obvious that in such cases the oil was absorbed by the wood, leaving the pigment high and dry with insufficient binder on top, simply held in place by the succeeding coats of paint. The drying of the paint used in renovating the surface caused a shrinking, which loosened the old undercoats, causing the scaling or flaking.

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Porch Floor Paint and Floor Paint Reviver.

Formula for producing a durable lead colored or gray paint for porch floors, that will retain its gloss after repeated scrubblings or moppings. Also a formula for a gloss dressing or gloss reviver for floors that do not require painting:—

The best paint for porch floors, if you do not care to use the ready-made article, is made by mixing equal portions of pure lead ground in oil and zinc, also ground in oil, beating these well together and tinting the mixture with lampblack in oil to the desired shade. Take, for instance, 25 pounds each of lead and zinc in oil and one pound of lampblack in oil, and break these up thoroughly, adding one pint each of turpentine and best brown japan. Then reduce to stout brushing consistency with two gallons double boiled linseed oil and two gallons of hard drying mixing or floor varnish, which should result in producing about six gallons of paint ready for use. Floor paints should not be too stout, but easy flowing. For reviving the gloss on old painted floors, apply a mixture of five parts heavy-bodied boiled linseed oil, one part best brown japan, and one part turpentine, all by measure. If floor is much worn, two or three applications may be required.

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Painting Frame House Left Unpainted for Several Years After Erection (Canada).

From what we know of the lumber used in house building in that locality we are of the opinion that the best treatment is to use a priming of strictly pure white lead (lead carbonate) ground in and thinned with pure raw linseed oil and very little if any drier made rather thin so as to permit it to penetrate well into the lumber; this coat allowed to dry hard. This is to be followed with two coats of such paint as you may select, each coat permitted to dry thoroughly. The priming should be tinted with oil color to approach the shade of the succeeding coat as nearly as possible.

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Cement Wash for Exterior Concrete Walls.

Wanted a good coating for the exterior walls of a reinforced concrete building, not a paint, but a wash to freshen up the surface which is still in the condition it was two years ago when the forms were taken off; something that will stand the weather.

(We do not know of anything superior for your purpose to the U. S. Government coating for lighthouses, which will serve for concrete as well as for brick walls. The formula is as follows:—Mix thoroughly three parts by measure of fresh Rosendale or Portland cement, and one part by measure of fine, clean sand in fresh water. If light gray is desired use light colored cement. Make the mixture of a consistency so that it can be applied freely with a large kalsomine wall brush. Stir frequently during application. Wet the surface with clean fresh water and immediately after apply the wash. Cannot be used over paint or whitewash.

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Preventing Scaling of New Paint from Old Painted Surfaces.

The best way to prevent new oil paint from peeling or scaling when applied over an old painted surface:—

By using sharp fine sand (in place of pumice) and water with a rubbing felt you will have a somewhat rougher surface upon which the new coat of paint will obtain a better hold, which will prevent peeling, especially if you add to the new paint a moderate portion of spirits of turpentine and using it fairly thin on the first coat, rubbing it out well.

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Apparent Reason for Exterior Paint Scaling.

Samples of paint scales were taken from a building the writer was about to repaint and on which the paint was coming off in many places clean to the wood.

In our opinion the paint was too brittle from priming to finish and we would judge that including the first or priming coat there were at least five coats of paint. That would mean that the building had three coats of paint originally and that in painting it over the second time two coats were applied. The original paint having given up its vehicle to the raw wood, it was not firm enough, although apparently so, to stand the strain caused by the contraction on the drying of the paint used in recoating which caused the paint to scale clean to the raw wood. By dissolving the scales with the proper chemical reagents, we find that while the top coat is fairly elastic, all of the under coats lack elasticity, especially the priming, and, in our judgment, there was very little pure white lead, if any used in these. The reaction in the test would point to the use of

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so-called combination white as the base of the paint. Our suggestion would be to remove all loose scale wherever it is required and to carefully test the remaining portions of surface where the paint appears to be still firm and solid, and if found loose have this removed also, and in repainting prime with pure white lead in oil tinted to suit. The priming to be rubbed in thoroughly and given ample time to dry. For succeeding coats, pure lead and zinc combined in the proportion of 80 per cent. of the former and 20 per cent. of the latter will give you best and lasting results.

Preventing Discoloration of White Paint on Sappy Pine.

Tin foil is only for interior work, to prevent moisture, but will not do for outside to keep back sap, neither will aluminum leaf. The only remedy we have ever heard of in a case of this kind is to remove all of the paint by the use of scrapers, and then coat all knobs and sappy places with a mixture of dry red lead and coach japan, slightly thinned with turpentine. When this composition has dried hard it should be touched up with a very light coat of gray, composed of pure white lead, a little linseed oil, drier and turpentine, so that two coats of white lead paint will cover over it.

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Relative Covering of High Grade Oil Paints on Different Surfaces.

A gallon of paint should cover 400 square feet of planed white pine boards, but will not cover more than 300 to 350 square feet of yellow or Southern pine, unless the lumber is very sappy throughout. On hard, smooth, plastered walls, 500 square feet will be covered by a gallon of the paint, but on a sandy wall more paint will be absorbed and 300 square feet will be the limit of spreading per gallon. Cement surfaces, no matter how smooth, will not be covered more than 225 to 250 square feet with a gallon of the paint. The same paint applied to hard pressed brick will coat 350 square feet per gallon, if the joints are well pointed, but will not coat over 125 to 150 square feet of soft brick, laid in large joints. If carefully brushed out on new or fairly clean tin surface, it will readily spread over 600 square feet. On tank cars it has been determined that paint made up of two-thirds lead and one-third zinc in linseed oil and drier, tinted with a little lampblack and a trifle yellow to a warm gray, did not cover more than 515 square feet of steel tanks, no matter how skilfully applied.

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Priming New Fir or Cedar Lumber on Exterior Work.

S. O. H., Minnesota, asks:—Should new lumber such as fir and cedar be primed at once or is it better to let it stand a few weeks on outside work before applying the priming coat?

Answer:—In our opinion, that depends on whether the lumber is dry and well seasoned or green. If dry and fairly well seasoned we see no reason why it should not receive the prime coat at once, after being in place, to keep it from warping. In the case of green lumber or when it is only imperfectly kiln dried, it should be exposed to the weather for a month or so. But in no case should the priming be applied after heavy rains until the lumber has become dry again. Many painters or consumers of paint years ago had an idea that after priming new lumber it should be permitted to stand exposed for a whole summer season before putting on the finishing coats, but experience did not show any real advantage.

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The Cracking of Zinc Paint, How Prevented.

All paints will decay sooner or later. Zinc will go by cracking, owing to the brittle nature of the metal from which the oxide of zinc is made. The question is simply how to mix zinc paint in order to make it wear longer without cracking. If white lead in oil is used as a first or priming coat under zinc paint, the tendency to cracking is, to a great extent, eliminated.

Paint made from zinc white alone is unfit for exposed work, as has been demonstrated by research. It has been found that for exterior surfaces the best wearing paints are those made from a mixture of pigments, such as, for instance, 60 parts white lead (lead carbonate), not more than 20 to 25 parts zinc oxide, the balance an inert white pigment, such as barytes or silica, ground in well-settled linseed oil, raw or refined, and thinned with raw linseed oil and a minimum portion of drier.

For interior work, zinc white is preferred to white lead paint as a finish, because when mixed with a minimum of oil and plenty of turpentine, it will not yellow off, as does white lead, producing a fine satin-like effect, and can be made in eggshell gloss finish or nearly flat, or when mixed with white damar varnish only will give a china gloss effect.

We have noted in the parlor of a mansion, where the woodwork was finished with two coats white lead in oil and three coats of French zinc white, in damar varnish, fifty years ago, not a single crack, scarcely any yellow discoloration, and a still fairly good gloss.

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Durability of Sanded Paint Compared with Ordinary Work.

According to the experience and observation of many old line painters sanding adds to the durability of paint in all situations where there is sufficient pitch for the water to run off. Sand is not generally used for several reasons:— First, because sand on the surface of paint spoils the effect of any but stone color to quite an extent; and, second, sand on paint is making it difficult for repainting, making slow work and is hard on brushes. However, well-painted and well-sanded work will, as a rule, last at least 50 per cent. longer than the same paint would without sand.

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Covering Southern Pine with Two Coats of White Paint.

Southern pine, being of a sappy nature, is very difficult to cover solidly in pure white with two coats of paint, because if laid on stout enough the paint is very apt to peel, and if rubbed out thin the grain will show through if the lumber is dressed smooth.

The best way is first to coat the surface with a priming of pure white lead and pure raw linseed oil, with a small portion of drier and one pint of spirits of turpentine for every gallon of oil used, tinting the paint with a little lampblack to make it a very light gray. Permit this coat to dry thoroughly, then finish with a medium stout coat of pure white lead in oil, using just enough turpentine to make it flow out uniformly and very little drier. Do not use boiled oil or turpentine substitute in either coat. In place of the pure white lead paint for the finish, you may, if you prefer, use any reputable brand of outside white, which is a combination of white lead and zinc white, with a minimum portion of inert material, but avoid the presence of zinc in the priming of hard or Southern pine.

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Best Priming Material for Fir on Exterior Work.

We believe pure white lead, so-called keg lead in oil, thinned with three parts raw linseed oil and one part pure turpentine with very little drier to be the best that can be used.

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Causes for Paint Crawling on Second and Third Coat.

If the second or third coat of oil paint crawls in good seasonable weather, the cause may invariably be traced to their being applied to a first or second coat that has not become hard enough to permit succeeding coats to lay down smoothly and uniformly. The same also applies in applying fresh paint over old surface, that has not been cleaned down properly before repainting as for instance on kitchen walls where the vapors from cooking, etc., have condensed on the surface, depositing grease on same. Oil or varnish paints will creep or crawl in frosty weather, also if applied in early morning dews before the sun has gotten in its work, in fact wherever the surface is wet.

PAINTING BRICK AND STONework.

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Renovation of Brick Fronts by Painting.

One of the many perplexing problems that confront the house painter and decorator is that of the proper treatment of brick fronts and brick walls in general, not because the practical man is unable to produce the effect or finish desired, but in taking into account the conditions of the surface and to meet the demand for moderate cost and yet guarantee durability and wear. The painter is often called upon to paint a brick wall that is damp and in some parts the brick may be shelled or may have crumbled. He cannot guarantee a durable job unless these conditions are removed. The crumbling bricks must be cut out and replaced by new ones. The dampness in the wall itself may possibly be cured by puddling the foundation of the wall and waiting for the drying out of the dampness before attempting to paint. Under no consideration should the painter undertake a job, except under a written guarantee from the owner that he will not hold him responsible for the failure that is sure to be the outcome. No desire for immediate gain will induce the reputable painter to undertake such a job. But when such conditions exist and the painter has pointed out to the owner the necessity for removing obstacles and the latter has consented to have it done, it is for the painter to see, before beginning his part of the work, that his specifications have been complied with. Any mold or so-called mildew on the old wall should be removed by the use of builders' acid, a mixture of equal parts of hydrochloric acid and water, using stiff fiber brushes, then rinsing with clear water. The joints of new brickwork should receive a treatment with dilute sulphuric acid, which will neutralize the alkali (lime) in the mortar, changing it into sulphate of lime (gypsum), which is inert chemically and cannot harm oil paint. If oil of vitriol is used it should be diluted with four times its volume of water and applied with fiber pencils. Two or three applications should be given and when dry a wash of clear water.

To make a good job of an old unpainted wall of this description, where new patches have been put in, the material should be selected according to the finish desired. For first coat, a mineral color, such as Venetian red, mineral brown or yellow ocher, ground in linseed oil and thinned with linseed oil and a moderate quantity of drier, should be applied fairly stout and well rubbed into the brick joints as well, and when dry the joints and shelled portions of brick should be puttied with good linseed oil and whiting putty that has been colored to the color of the paint with the same pigments as are used in the paint itself.

For second coat the paint should be mixed to a color fairly close to the finish desired, and if the color be other than red or brown, a small portion of white lead, say one-fourth the quantity of the total of paste used, should be introduced, the paint to be thinned with three parts raw linseed oil and one part turpentine, with a small portion of drier. The finishing coat to be full gloss linseed oil paint of the proper color desired. This is for an ordinary garden wall or the exposed side wall of a house, where less than three coats of paint should not be considered, because the main object of painting here is for preserving the wall, rather than for ornamentation.

The painting of the brick front of a residence or other building is done for ornamental purposes, more than for preservation. A front built up of the best Philadelphia pressed brick is a treat to the eye. When it still retains its original freshness it cannot be improved by the painter's art, but when, as it frequently happens, the best selection has not been used in the wall, or when atmospheric conditions have set in their work of decay, the services of the painter are called in requisition. The cost of pressed brick being rather high, the builders of cities outside of Philadelphia, notably New York and Brooklyn, are employing a cheaper grade of bricks and painting the fronts. This practice is to be commended, not only from the painter's point of view, but also because the paint acts as a preservative, and utility and decorative effects are obtained at one

operation. Thus a good imitation of pressed brick can be obtained, as will be seen in the following:—In painting a brick front the points to be observed are: first, the condition of the surface; second, the exposure of the surface; third, the best time of the year to do the work; fourth, the quality of the materials to be used, and fifth, the method of doing the work.

On new work, where hard brick has been used, the priming should be made of a good Venetian red for red work or yellow ocher for Milwaukee color, made rather thin with raw linseed oil and very little drier. For old brick or soft new brick, the prime should be stouter, so as to act as a filter also, and should be well rubbed in. However, in all cases the surface must be well cleaned before priming, and at any time the surface must be thoroughly dry, the summer and autumn seasons being best for painting brick. When the priming is dry, the next step is to putty up all holes and defects, as well as open joints, with whiting and linseed oil putty that has been colored dry Venetian red or yellow ocher to match the priming coat. The puttying must never be done directly on the surface, but always after priming.

Before we proceed it may be well to call attention to the fact that southern exposures require more paint than any other; that on old fronts, especially chimneys and wherever any efflorescence shows itself, a wash with dilute muriatic acid is a necessity, and especially that inasmuch as brick fronts have a most severe exposure there is no material too good for painting them. The not uncommon notion that anything is good enough for a wall must not enter into this branch of painting. In most good jobs of this kind three and even four coats of oil paint are given before the flat finish is applied. Sometimes, however, a priming as above noted and a second coat of color, mixed of equal parts raw oil and turpentine with a little drier, are considered sufficient as ground for the flat coat.

No matter how many coats are given, the last coat of ground work should dry with a subdued gloss uniformly over the whole surface. The flat finish is made from Venetian red and yellow ocher, for the various shades of red brick, and from zinc white and yellow ocher, etc., for the Milwaukee brick color. The material should be ground very fine with linseed oil, japan and turpentine to stout paste form, which, when thinned, will give a flat surface similar to that of pressed brick on drying. Some manufacturers of paints supply these flat brick colors in paste form, and uniformity can be depended upon. The beauty of such fronts is enhanced by lining the joints in either white or black for red fronts, and black or blue, sometimes red, for Milwaukee brick effects. The greatest attention must be given to the striping, because if this is done carelessly the whole effect will be ruined.

—201—

Painting Face Brickwork.

My idea of the best method is to make a mixture of one-half raw oil and one-half turpentine with a little drier, but no pigment, and go over the brick front with that first. Then, when that dries, I would make a prime that would dry half flat; that is, using half oil and half turps for thinning the paste color. For the second color coat I would take either Venetian red or a mixture of Venetian red and ocher in oil, according to the color I wanted, and thin it with all turpentine and a little drier. The oil used in grinding the color is sufficient to bind it to the wall and keep it from washing off. The paste brick colors put up by a good many manufacturers to imitate different kinds of brick are all right, and save the trouble of tinting up Venetian red with ocher.

The Veteran Painter.

—202—

Oiling New Pressed Brick.

I remember one pressed brick front in Philadelphia that was given a coat of hot linseed oil as soon as it was built. I know that front stood for years without

showing any discoloration, and it seems to me that this makes a fairly efficient preventive of saltpeter stains. It does not have the appearance of a coat of paint either, but merely darkens the red of the brick.

—203—

Painting Old Brickwork in Imitation of Pressed Brick.

A Canadian painter wanted to know how to repaint an old brick house where the brickwork is in bad shape, some hard and some soft brick. Had been told that oil paint is unsatisfactory on account of the climate. The owner would like to have an imitation of Philadelphia pressed brick.

Three to four coats of paint are required to make a good job of a painted brick wall such as you describe. The first coat should be made up from pure white lead and dark Venetian red in oil, about equal parts by weight, thinned with raw linseed oil, a small quantity of brown japan and a little turpentine.

When this coat has thoroughly dried, a second coat of the same material, thinned with two parts raw linseed oil and one part turps and drier, is given, and when this has dried all open joints and other imperfections are puttied up with glaziers' linseed oil and whiting putty, stained with Venetian red to match the color of this second coat of paint. If only three coats are to be given the puttying is done on the first coat. The third coat should be made up of dark Venetian red and yellow ocher in oil and thinned with equal parts of kettle-boiled linseed oil and turpentine, with the necessary drier. This coat should always follow the puttying, whether a three-coat or four-coat job is under way. The finishing coat must be flat, or, at any rate, not more than a faint eggshell gloss. To make one gallon of this paint, mix five pounds French yellow ocher, ground in japan; four pounds Venetian red, also ground in japan; three pounds finest cliffstone whiting, dry; one-half pint of boiled linseed oil; beat up well and thin with one-half gallon of pure turpentine, pass through a fine paint sieve or cheesecloth and apply one coat only, taking small stretches and cutting in, so that there will be no laps or holidays. Test this paint on a painted board to see whether it is not too flat. If it is too flat or lacks binder, add sufficient boiled oil. For penciling in the joints, use pure white lead in oil, thinned with turps and a little pale drier for white, and lampblack ground in japan, thinned with turpentine and very little boiled oil, for black.

—204—

Painting a Soft Brick Wall.

There was a man who asked about painting a soft brick wall, from which the paint came off. If he would take a brick and soak it in water, he would be surprised to find how much water it will absorb. I don't care how hard or soft a brick is, it is porous. It is astonishing how quick a brick will take the oil out of paint—it's just like putting the paint on so much blotting paper. So, as there's nothing to bind the pigment together, it isn't strange the paint won't hold to the brick.

If a bricklayer attempts to lay bricks dry, they will soak the water right out of the mortar and leave it almost dry, so it will not hold. You must either dip the bricks in water or thoroughly wet them down with a hose before you can lay them.

I would not wet the bricks before painting, but I would give them one or two coats of oil before painting. This same treatment would apply to a frame house that has stood until the white lead has got in a powdered condition and then commenced to chalk. The old surface will absorb the oil from the paint unless it is oiled first. Of course, I wouldn't use pure oil. We use one-third or more turpentine and not over a pint of driers to five gallons of oil. The turpentine will evaporate and the oil will soak in and dry dead, which is what you want, and on an oil painted surface it will fasten the paint that has commenced to

chalk. For outside painting we generally use from four to four and a half gallons of oil to a hundred pounds of lead, and paint mixed that way ought to stay where it is put on a good surface.

The Veteran Painter.

—205—

Best Red Paint for Soft Brick Walls.

What will make the best red paint for two-coat work on a soft brick wall that has not been painted before? Would it be best to use raw or boiled linseed oil? And would gasoline be all right for a thinner?

You cannot make a solid job with two coats of paint on a soft brick wall. Even a hard brick wall should have three coats. The proper way to paint brick walls in brick color is to mix Venetian red and yellow ocher in such proportions as will produce the shade desired.

For first coat, thin with raw linseed oil and a little drier, no turps or benzine, and brush the paint well into the brick. Putty up joints, etc., when this coat has dried, and color the putty with the paint.

For second coat, use the same colors, Venetian red and yellow ocher in oil; add about one-fourth as much keg led and thin with equal parts raw linseed oil and turps or benzine and some drying japan.

The finish, if gloss is wanted, should be Venetian red and yellow ocher, no lead, thinned with boiled linseed oil and a little drier. If flat effect is desired, thin Venetian red and yellow ocher, ground stiff in raw oil, with one-third brown japan and two-thirds turpentine, or benzine. Gasoline should be avoided, as it is too volatile to be used in paint. To make the paint work well and keep from sagging, a portion of dry whiting, say five pounds for every twenty pounds of color, may be added.

—206—

Painting a Brick Front Dark Red in Flat Finish.

A Philadelphia painter had a great deal of trouble with a brick front which he painted in the fall. The condition of the surface was first class and he intended to use only one coat of oil color and one coat of flat color, but his men put on the priming coat too heavy and did not brush it out properly. The night after it was applied frost set in and the paint ran down in some places and crawled in others. After allowing it to dry hard he cut the surface down with scraper and sandpaper, then gave it another thin coat of the same oil color, a mixture of Venetian red and metallic brown, which appeared to have a good gloss, when he applied the flat color, that he bought from a **reputable firm**. He thinned it and added first class outside varnish as a binder, but in the following spring the color came off when rainy weather set in and reddened the white marble base of the front. He asked advice as to proper method for doing work over.

You should have given two coats of Venetian red in oil in the first place, the first coat rather oily, the second coat stout, but both brushed out thoroughly. Your flat coat should have consisted of a dark shade of Venetian red with enough metallic brown in it to bring the desired depth of shade. Both of these colors should have been ground stiff in linseed oil and have been beaten up with one-third brown japan and thinned with two-thirds turpentine, to which might have been added a little good outside or spar varnish as an additional binder. We have seen fronts done in this way stand for six years, even ten years. To make your job good, we would advise you to use a stubby corn broom and brush the front down, then give a coat of Venetian red, thinned with pure raw linseed oil and a little brown japan, rather thin and stout, over the flat red, and if this dries out uniformly glossy without sinking in anywhere you can safely apply your flat coat, made as suggested above, otherwise you will have to give a second coat of the oil color. Do not apply your flat coat unless your groundwork is good and hard, and, above all, do not begin work until there have been a few dry days.

—207—

Painting Brick Walls That Have Been Whitewashed.

The manager of a large manufacturing plant wanted the walls on the inside painted in oil forty-four inches from the floor. The walls were of brick and had been whitewashed nearly every year for thirty years; salt was not used. The wall is not all alike, some places clean and some very greasy, while others are bare to the brick. The job when finished is to be a high gloss.

For the greasy portions of the wall there is nothing better than the vinegar treatment; use a good scrubbing brush dipped in strong vinegar and give this part of the wall a good rubbing over. This will remove most or all of the grease and make the paint adhere, unless you make it too oily. On the places where the bricks are bare of whitewash, use first a good stiff broom to remove any loose lime and dust, then give a thin oily priming, which let dry and putty up where needed. Then, in order to save in the number of coats, give a coat of glue size over the priming, and when this is dry putty up the joints, using a good linseed oil putty to which some dry white lead and a little drier is added. On this flat surface give a coat of white lead, which should be held half flat, if a gloss coat is to be given as the finish. For a job to stand frequent cleaning it is best to finish with a coat of zinc white that has been mixed with a pale, hard drying varnish. At any event, in order to produce uniform effect, you will have to build up a ground work on the bare brick before applying the gloss finish.

—208—

Paint Scaling from a Brick Wall.

Trouble was experienced with the wall of the north side of a church, from which the paint is scaling. Three years before this church, including the brick wall referred to, was painted. The wall was always damp, but the trustees of the church thought that paint would keep the dampness out. Two years later most of the paint came off the wall and our correspondent was asked to repaint it, though he suggested that the man who had painted it previously should do the work. On being persuaded he undertook the job, using concentrated lye to remove the paint still remaining, rinsing with clear water afterward. Then he used a size of gloss oil thinned with benzine to stop absorption; after this a coat of lead paint, thinned equal parts raw linseed oil and turpentine. On this a second coat of lead paint thinned with 2 parts turps and 1 part oil. Third or finishing coat, 2 parts oil and 4 parts turps, with sufficient drier. This was a year ago, and a few days ago he was notified that the paint was coming off as badly as before.

In the first place this wall should not have been painted, excepting after a long dry spell in summer. In the second place, it was a mistake to use concentrated lye solution for taking the old paint off, as the bricks not only absorbed the solution, but also the water used for rinsing. It would have been far better to take off whatever paint was loose with stiff brooms and allow the balance to remain or to use the torch, which would have assisted in expelling some of the moisture. The sizing of the wall with gloss oil thinned with benzine was another error, gloss oil being simply rosin dissolved in benzine, and this will not resist moisture in the slightest degree. Under the conditions named the thinning of the various coats of lead paint with part turpentine was not a bad idea, but appears to have been carried to extremes, producing a lack of binder. All these factors worked together in producing the result stated. As to the remedy, none can be suggested that will be certain of good and lasting results. The gasoline torch used with good judgment, so as not to harm the bricks, would strike us as the best means to remove the paint and size that may still remain on the wall and at the same time draw out some of the moisture. Then prime or first coat with a lead and zinc paint tinted to suit, using at least 75 parts of lead to 25 parts zinc in oil, thinning with 4 parts raw oil and 1 part turps and drier, permitting this coat to become good and hard before proceeding to apply a second

coat of a similar composition, thinned 2 parts raw oil to 1 part turps and drier. The finishing coat should be thinned similarly to the first coat, but held stouter, and each coat brushed out to the utmost, each to be allowed to dry as hard as possible before applying the next.

—209—

What Is the Cause of Painted Brick Fronts Turning White

In the summer of 1902 the questioner painted the brick front of a dwelling, applying a first coat of mineral brown, puttying up with colored putty, then giving a second coat of mineral brown, followed with a solid coat of flat brick red. This stood well the first winter, but during the winter of 1904 it started to turn white, more so on the third story than on the first or second, the edges of the bricks turning white and the putty in the joints becoming powdery. Another front next adjoining, done by another party, also stood well up to that time, but became of a similar condition.

We have noticed this whitening of bricks, usually termed efflorescence, more during the winter and spring of 1904 than at any time previous, on unpainted red brick fronts and even on the edges of brownstone door and window arches, where they adjoin the bricks. We have also noticed the same white appearance on exposed brick fronts after heavy thunderstorms in August and September and have heard a chemist advance the theory that it is due to sulphur-laden atmosphere, which, however, is hardly plausible. As the efflorescence is more apparent after a heavy storm in winter, when the sides of houses have been coated with a sheet of ice, the theory that the soluble salts in the brick and mortar are dissolved by the extraordinary amount of moisture, causing the salts to exude, is a more practical explanation of the cause. When an apparently dry brick wall has been given three coats of good oil paint and the joints have been well puttied, this efflorescence is hardly ever noticeable. On the other hand we have seen brick walls that were partly damp, painted with one coat of red in oil, then with one coat of red in equal parts of oil and turps and finished with red brick stain or flat brick color, and after the first winter the paint had peeled or perished and the mold or efflorescence appeared in various places, the dampest spots showing mold, others white powder.

—210—

Mildew or Fungus Growth on Red Brick Fronts.

This fungus growth is due to the formation of an organic structure such as moss, or fungi. Moss easily grows when there is a plentiful supply of lime in the water together with the presence of a little clay, which causes the mortar to retain the moisture, and this helps in the generation of the growth. One remedy is to wash the brick front with diluted hydrochloric or sulphuric acid; the latter is preferable because it forms solid lime salts in combination with the moisture, whereas hydrochloric acid will form soluble lime salts that will continually reappear while the wall remains damp. After washing the bricks with the acid solution, they should be coated with a solution of paraffin wax (one to two ounces) in paraffin or kerosene oil (one gallon), applied hot. This will arrest all further appearance of the fungi growth, of whatever nature it is.

H. C. Standage.

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Mildew or Fungus Growth on Red Brick Fronts.

Information was desired for removing and destroying mildew or fungus growth from brick walls that have been painted several years and on which has formed a black substance known under the names given. Can it be removed or destroyed, so that it will not appear again on repainting? The inquirer had an

experience of the returning of fungus growth, or whatever it may be called, after giving an old painted front one coat of Venetian red and linseed oil paint and one coat of flat brick red. The work was done in June and now there is again a mossy appearance.

We are of the opinion that this is fungus growth, brought about by dampness in the brick. Most likely the cause that brought about the trouble was present but unnoticed when the wall was painted originally, and only became apparent as the paint lost its life and could no longer hold back the exudations of the fungus. The only remedy seems to be to use the torch for a twofold purpose; that is, to remove the paint and also destroy the primary cause of the trouble by driving out moisture from the wall. It is a stubborn fact that oxide of iron and linseed oil paints are more sensitive to and more readily affected by moisture and fungus growth than white lead and zinc white combinations. Especially is this the case or the rule when oxide of iron paints carry much combined water in their gangue. We should very much like to hear from our readers what their experience has been on this subject, or whether any one can tell us of an effective remedy for this trouble. A washing of the walls with builders' acid (dilute hydrochloric acid) has been proposed at various times, but no one appears to have had any real success from the method.

—212—

To Clean Brick That Is Discolored by Mildew.

To clean common red brick which is stained by mildew and where it is not desired to paint the walls.

Sponge the bricks thoroughly with a mixture of equal parts muriatic acid and water, then wash down with clear water, and if this does not give satisfaction, give them a wash made as follows:—Dissolve one ounce of glue in a gallon of water; when glue is dissolved and the size still hot, add two ounces of alum, then stir into the size one pound of Venetian red, and if this is too red, add enough mineral brown to bring out the right effect. Give the wall one coat of this stain.

—213—

Cleaning Smoke Stains from Brick Fronts.

What will clean a red brick front from smoke and stain caused by fire?

To one gallon of good soft soap, not too watery, add two pounds of powdered pumice, 00 or F., and one pint of liquid ammonia, the article sold as household ammonia will answer, though it will be all the more effective if a little stronger. First remove as much of the soot and dust as possible with a stiff broom or fiber brush, then apply the soap and ammonia mixture with an ordinary fiber wall brush or common whitewash dip, let it remain for about twenty to thirty minutes, then with a good scrubbing brush rub it briskly, dipping the brush into clear water once in a while. Have a few pails of clear water handy and a large carriage sponge to go over the scrubbed surface, and finally rinse with clear water. If convenient, use a hose with spray nozzle for rinsing. This will remove the most stubborn case of staining from fire and smoke.

—214—

Binder for Cold Water Paint on Stone Work.

The proper binder for a cold water paint for the stone walls of a house was wanted by a painter who had the required pigment to match the stone, but needed a good binder.

There are quite a number of binders or mediums for this purpose, but none of them equal linseed oil in point of service. The very simplest binder we know of is the brine of salt mackerel or salt herrings. To use this to advantage, some

burnt lime is slaked and then thinned with the brine, and to this the coloring pigment is added.

Or take one gallon of skim milk, one pound fresh slaked lime, three pounds of bolted whiting, one-half pint raw linseed oil, in which two ounces Burgundy pitch or white rosin has been melted. The lime is to be air slaked and mixed with one quart of the milk. Add a little of the oil and pitch or rosin mixture to the milk and lime, then add balance of milk and the whiting, and finally enough of the pigment to produce the desired color. Strain through fine sieve and use inside of three or four days.

—215—

Removing Grease Spots from Stone Work.

To remove grease spots from stone steps or stone floors, pour strong soda water or boiling hot water over the spot, then lay on a thin batter made of fuller's earth and boiling water; let it remain on over night, and if the grease be not removed repeat the process. Sometimes the grease may be taken out by rubbing the spot with hard stone, using fine sand and very hot water with soap and soda.

—216—

To Remove or Kill Moss Growth on Stone or Brick Work.

Wet the surface in question well with water, to which has been added 2 per cent. by volume of carbolic acid. After an hour or so the growth can be removed with a stiff brush and clear water. If some of the growth should still adhere, repeat the operation.

—217—

Enameling a Brick Wall, Laid in Cement, for an Engine Room.

It is required to paint in oil color, or possibly enamel, the inside brick walls of a recently built engine room.

As you cannot wait for the cement in the joints to lose its possible caustic properties, it will be best to make a solution of 12 fluid ounces oil of vitriol to one gallon of water, and with this saturate the cement in the joints thoroughly, allowing the cement to become dry again, when a white porous crust will form, which should be coated with pure raw linseed oil until suction is fairly well stopped. If, however, the cement is over a month old, a solution of four ounces of bicarbonate of ammonia in two gallons of water may be used in place of the dilute oil of vitriol which will prove more effectual and time saving because in that case the wall may be primed as soon as the joints have dried again. A trial will prove whether the joints are more absorptive than the bricks, in which case the joints should be coated to stop excessive absorption before the wall is primed. For priming we would recommend an oily white lead paint with a moderate quantity of drier. If enamel is wanted as a finish, the second coat should be held less oily and the third coat nearly or quite flat. For the enamel we would suggest French zinc in damar varnish, thinned with a pale enamel varnish, tinted to suit. If every coat is allowed to dry hard before the next is applied there will be no great risk of the heat affecting the enamel. But while the work is being done the temperature of the room should not be below 70 deg. F.; rather warmer, if possible. In selecting the varnish for the enamel care should be taken to avoid the use of one that is liable to soften under the influence of heat.

—218—

Best Material and Method for Painting Brickwork in Flat Finish.

The best way to paint a new brick wall in red is to use a good Venetian red in oil, thinned with pure raw linseed oil and a little liquid drier only. Have this priming thin and flow it on freely and brush it into the brick well. Give plenty of time for drying, then putty up. For second coat use at least 25 per cent. pure white lead with your Venetian red and thin it with three parts raw linseed oil and one part turps, adding the necessary drier. Have your paint for this coat of good body and rub it out well and even.

For the third or finishing coat use a fine, stiff ground Venetian red of the proper shade, and if necessary for light red brick, add some French ocher to obtain desired shade; thin this with plenty of brown japan and turpentine to a thin wash and apply quickly, avoiding laps. If it does not flat immediately, it will do so in a very short time. Should it dry too flat or lack binder, add a little boiled oil. The best plan, however, is to purchase the flat brick red offered by paint manufacturers, and thin and apply as directed by them. If the brick front is to be lined in white, use white lead thinned with turps; for black use lampblack in oil, thin with japan and turps. When you undertake to paint brickwork always see to it first that the brick is dry. If you paint immediately after heavy or driving rains or where there are leaky roofs or cornices, from which the bricks become damp, you run a heavy risk, as your paint will surely scale sooner or later. If you find the wall is not in proper condition for painting, call the owner's attention to it, and if he persists in having the job done without first remedying the defects, do it at his risk only.

The best size for new common brick that is to be painted is an oil priming, as noted above. The pigment to be used in this priming may be white lead, yellow ocher, Venetian red, mineral brown or any other mineral paint that may be suitable or allow succeeding coats to cover well. No other size or material is suitable for first coating exposed brickwork new or old. As to a size for new plastered walls, we do not approve of a size directly on the plaster, but recommend a thin wash of white lead, thinned with pure raw linseed oil and a little turpentine to make it penetrate well into the wall. Unless the wall is very hot this will neutralize whatever causticity there may be in the plaster, and when the priming is dry a coat of glue size may be given, which will save several coats of paint. When a new wall is still very hot, that is, when the lime in the plaster has not had an opportunity to become neutralized, it is best to give a wash of vinegar before priming.

—219—

How to Paint a Whitewashed Brick Wall.

An engine room had received two coats of lime whitewash with plenty of salt. This coating did not brush off easily, and the owners wished it painted. The temperature of the room is about 75 deg. F.

If the whitewash has been applied recently, say within two or three months, it is best to scrape off as much as possible and give the wall a wash of strong vinegar and let it dry. If the whitewash is over six months old give it a good brushing down with a stiff broom so as to remove all that is scaly, and then give the wall a wash of white lead, using about nine pounds of keg lead to five pints of raw linseed oil, one-half pint turpentine and one-half pint good liquid drier that is free from rosin or gum. This wash will penetrate into the wall, binding the remaining whitewash so that it will not peel and take succeeding coats along with it.

Now putty up joints, if a good, smooth job is desired, using good linseed oil putty, to which add some dry white lead and a little drier.

On this flat surface give another coat of white lead, which should be held half flat, if a gloss coat is to be given as the finish. For a job to stand frequent

cleaning, as is the case in the walls of an engine room, it is best to finish with a coat of zinc white that has been mixed with a pale, hard drying varnish. You need have no fear of the effect of the limewash upon white lead paint if you neutralize it with the vinegar wash referred to, nor if the limewash is over six months old. After you have the whitewash securely bound to the wall with the first coat of lead, as noted, you may proceed as you would in painting a plastered wall.

—220—

Renovating a Painted Brick Front.

The method usually pursued in repainting brick fronts is to use bent steel scrapers where the paint is soft and scaly, following with stiff brooms or brushes, removing all the loose paint and allowing the balance to remain, as it will not show when the front is painted in flat color. Burning off with the torch would be the quickest and surest method in your case, but you would have to be careful to keep the flame away from the marble sills and trimmings to prevent their being scorched. There are many ways to remove paint without burning, but these preparations make such a mess on a brick front that the dry way of scraping and brooming is the best. You are the best judge as to the proper method to pursue in this case, as you are on the ground and it will be a matter of an hour's time for you to ascertain whether you can get the harder portion of the paint removed by scraping or whether it is best to resort to burning. In using either method you will save yourself the trouble of washing down the front, which you would be compelled to do to save your new paint from being attacked if you used an alkaline paint remover.

—221—

Best Method for Making Brick Walls Moisture or Waterproof.

In the line of paint, we have had the best success by following this method:—All dampness must be allowed to dry up as much as possible, then one coat of boiled linseed oil of good body is given and all joints and holes puttied up with pure linseed oil and whiting putty, colored with fine brick dust or Venetian red. This dry and hard, a coat of Venetian red, thinned with equal parts of boiled linseed oil and turpentine, is applied, and finally a third coat of red oxide or Venetian red, thinned with good raw linseed oil and some good oil drier, is applied as a finish. Or the color may be changed from a red to any desirable tint, using white lead as the base, tinting with oil color to suit.

The first coat should always be either all oil, or at least contain but little pigment, the second coat half flat and the last coat full gloss, and less than three coats will be insufficient. It is best to vary the color of the coats somewhat, so that laps or holidays may be readily noticed. In our opinion, such impregnation of the walls, though of higher cost, is superior to rough cement plastering.

—222—

The Cause of Mold or Efflorescence on Brick Walls.

Moldy patches came out on brickwork having a northern exposure, that had been painted the year before.

There seems to be no reasonable doubt but that the brick work you refer to was either full of moisture before you painted it, or there is a leak in the roof, which allows moisture to get into the brick work back of your paint.

The soluble salts in the mortar or in the brick itself become dissolved by the moisture and must work their way out somehow, and as they are hardly liable to work out through the plaster within, they are bound to come out through the paint. It is but reasonable to assume that on a northern exposure,

where the sun never strikes, the wall was damp previous to being painted. There is no real effective method, and the best that can be done is to scrape off the paint wherever mold or efflorescence is noted, and treat the surface to several washes of phosphate of lime solution or phosphoric acid preferably, or dilute with sulphuric acid, and, after rinsing and allowing the patches to dry out thoroughly, to repaint. This treatment will neutralize the soluble salts in cement or mortar as well as in brick.

—223—

Silica for a Brick or Cement Wash.

Silica, when obtained from flint, is called silex, and that obtained from sand or quartz is known as silica or silver white. Pure silex does not contain lime in any form, hence there is no lime preparation that equals it in character. Commercial whiting consists of about 84 per cent. carbonate of lime in the form of chalk and 16 per cent. of silex or silica (flint or sand). Silex would not improve whitewash in either body or binding properties, as it is a very brittle material. Fine whiting is often added to whitewash to improve its body, glue or rice flour to improve its binding properties, dairy salt to keep the whitewash from drying too quickly and from rubbing off after drying, but we can see no advantage whatever that could be gained from the addition of silica, silex, marble dust and similar whites.

—224—

To Close Up Cracks in Brick or Stone Walls to Keep Out Moisture.

You have, no doubt in your shop some paint skins or the remnants of linseed oil paint from paint pots. Take the oiliest or softest of these and run them through a paint mill or strainer. Fine grinding or staining is not required. If not thin enough for a mixed paint, add the foots of your oil tank or oil barrel, until you have such consistency. Now work in enough of dry common whiting to make the mass about as stiff as glazing putty and then add to it enough good Portland cement to enable you to handle it without it sticking to your hands. In that condition it may be pressed or worked into cracks in stone or brick walls, and when it has become hard it will be adhesive and will not be penetrated by moisture, and will stand any reasonable degree of heat as well.

—225—

How to Prevent Moistures Striking Through Brick or Plastered Walls.

Whenever a driving rain strikes the outside of a brick wall, the inside of which has been plastered directly on the brick, the wall paper becomes damp and comes off.

After a prolonged dry spell, which has given the wall a good chance to dry out, put on a good coat of oil paint, which will soak well into the bricks, then putty up the joints and all the holes that may be in the bricks with glazier's putty stained the color of your paint. When this is dry, give a second coat, not quite as oily as the first and finish off with a coat of flat brick color, or if this is undesirable, with a good glossy oil paint.

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Removing White Spots from Bricks and Terra Cotta Trimmings.

From your statement that only one of the two kinds of terra cotta bricks used in the front show white spots, it is evident that the efflorescence is due to mineral salts in the brick and no matter what neutralizing agent you may

employ, the spots will appear again and again, so long as there are soluble mineral salts in the material from which the brick or terra cotta facing is made. You can remove the white spots by sponging the surface thoroughly with a mixture of equal parts of hydrochloric acid and water, and afterward washing down with clear water, but in nine cases out of ten the spots will reappear after a driving storm, because the moisture sets free more of the salts, which have not been fully neutralized by the dilute acid. The best preventative, after the front has been sponged with the solution, washed down with clear water and allowed to dry thoroughly, would be the application of two or three coats of good oil paint, the finishing coat of which might be held flat.

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Brick Stains or Flat Brick Colors.

Formula for a brick stain for the fronts of old brick houses. To be penciled in order to give the appearance of pressed brick, something that will stand the weather.

If you merely wish to stain the bricks without filling them for a good smooth finish, you can prepare a wash or stain by breaking up a light shade of Venetian red ground in oil, adding some yellow ocher if desired for the salmon red effect, thinning this paste with brown japan and turpentine substituted, as pure gum spirits or even wood spirits of turpentine are most too expensive for that sort of work. For 25 pounds of a mixture of a good Venetian red in oil that does not contain less than 35 per cent. ferric oxide in the pigment and French yellow ocher in oil we would suggest one-half gallon of brown japan of fair quality, and from one and one-half to two gallons of turpentine substitute or benzol of 90 per cent. quality. Ordinary benzine (petroleum naphtha) is not to be recommended on account of its too rapid evaporation and consequent difficulty of obtaining a smooth finish.

In Eastern cities, especially in New York and Philadelphia, many renovated brick fronts will be noticed that are done in excellent shape. The finishing coat is what is known as flat brick color, several shades of red, light, medium and deep, also two shades of buff or yellow being furnished in paste form by paint manufacturers, the lighter of the two being known as Milwaukee brick, the darker buff as Western brick color. These pastes are ground in linseed oil and japan drier, requiring only thinning with turpentine or turps substitute, drying dead flat over the proper ground, which for ordinary work consists of two oil color coats and a filling with putty, while on the best class of work as much as four coats are given before the finish is applied. The surface in this style of painting is built up as follows:—The first or priming coat is Venetian red, thinned with raw linseed oil and liquid drier, rather thin, so as to penetrate well into the brick and allowed to stand a few days, then all imperfections in the brick and the joints are filled with pure linseed oil and whiting putty that has been colored with Venetian red. Next a coat of Venetian red, to which for good work some pure white lead is added, is applied. This for a two-coat ground work is thinned with three parts raw linseed oil and one part liquid drier, so as to dry with fair gloss. Upon this the flat finish is applied, one coat only, taking care to avoid laps. When more than two coats of ground are given the coat over the puttied up priming is made half flat, but the coat next to the finish should always have a fair gloss. For Milwaukee or buff brick color the priming should be pure white lead and yellow ocher, thinned in the same manner as the red prime, while the putty should be colored with yellow ocher. To make the flat brick color for this work, unless you purchase it in ready paste form, it is best to obtain for the red stiff ground Venetian red and French yellow ocher, breaking up the color with a paddle and mixing the two until the proper shade is had, then for every ten pounds of such paste add one pint of a good drying japan and three pints turpentine or reliable turpentine substitute and run the resulting liquid paint through a paint strainer. Keep it well stirred while using and apply with full bristle 8-0 brush, cutting in on the joints to prevent laps. We know of buildings done in this way that have

stood for ten or even fifteen years without requiring renovating, while others that were done by a cheaper method looked unsightly in two or three years. To make the Milwaukee finish we suggest two-thirds pure white lead and one-third zinc as the base with yellow ocher, chrome yellow and a tinge of Venetian red for coloring, thinning in similar manner as noted above for the red, but using less thinners.

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Removing Efflorescence from Surface of Brick Walls.

Can you inform me if there is any preparation which will kill the salts that come to the surface of a brick building? The wall faces the east and was put up during the early spring. It has been cleaned down with builder's acid in the usual way, but the efflorescence reappeared after the first storm.

Builders' acid (a mixture of equal parts of commercial hydrochloric acid and water) is most commonly used as a wash, but in most cases it fails to stop efflorescence, the white substance appearing again for some years after every driving rainstorm. Scientists differ as to the cause of the efflorescence, some laying it to the caustic lime in the mortar in which the bricks are laid, while others claim that it is due to sulphur in bricks that are burnt by using bitumencous coal for fuel. One chemist claimed that the occurrence was most frequent after heavy thunderstorms, but the writer has noticed whole blocks of houses, after having been coated with sheets of ice during northeast gales, covered with the white substance, which disappeared, however after a few days of warm weather and sunshine. In many cases, as the building becomes older, efflorescence ceases to appear. This would go to show that whatever causticity is in the mortar has been neutralized by time and exposure, the caustic lime having changed to calcium carbonate. If efflorescence is really due to the mortar, dilute sulphuric acid would be the means of changing the lime into calcium sulphate (gypsum), but the treatment would be superficial only, as the dilute acid would not penetrate deep enough. If the bricks were painted with several coats of oil paint after a long spell of dry weather it would go far toward prevention. A simple coat of oil or oil and turpentine will not stop it. If the efflorescence were due to sulphur in the brick the application of a strong solution of caustic soda, to be left on fifteen minutes, then washed off with clear water, and the surface well rubbed with stiff brushes or brooms, would remove it and go far toward a remedy.

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Painting Brick Wall, Treated with Paraffine.

Assuming a new brick wall interior exposure has been waterproofed with paraffine, applied hot, and is to receive four coats of lead oil paint; how should this be done or what is necessary to be done to the surface before applying the lead oil paint to insure its adhesion?

It makes very little difference in what form the paraffine was employed, whether it was in the form of oil or as a black liquid tar containing paraffine, the problem is a very difficult one, unless there is a material applied to the bricks that will isolate the lead and oil paint from contact with the paraffine. The form in which the paraffine was applied should be known before a definite answer can be given, because it is not a question of adhesion alone, but also whether the paraffine substance with which the bricks are impregnated will eventually discolor the paint in spots and blotches. If the paraffine in question is of coal tar origin, it is more than likely that such will happen, even if four coats of lead and oil paint are applied. If the paraffine is of petroleum origin, discoloration need not be feared, but there is a greater risk of non-adhesion of the lead and oil paint.

To make sure of keeping back the paraffine, one coat at least of a spirit varnish, made from genuine brown or orange shellac, dissolved in wood alcohol

or denatured spirit, would be in order, and while this looks like a costly experiment, it is far less expensive than to take any risk. On top of this coat the first of the lead and oil paint must not be too oily, but should be held in semi-gloss, and after all, it will not be necessary to give four coats, because the one coat of spirit varnish will answer for one coat of paint at least. If the lead and oil coats are to be dark in color, one flat coat of the paint itself might answer in place of the spirit varnish, if the succeeding coat is made semi-gloss and the two final coats are held in full gloss. But these are merely suggestions, and if you have such a job on hand, we would advise you to first try a small space in a remote corner of the wall.

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Reliable Stain for Pressed Brick Fronts.

We have known of red brick stain that was made by mixing dry Venetian red with water into a pulp, pressing it through a sieve to break up lumps that formed in mixing, then adding enough stale ale or beer to make the stain of proper consistency. To each gallon of this mixture was added one-quarter pound of calcined green copperas (iron sulphate), previously beaten up with a portion of the stain to a thin batter. This is the mordant, or fixative, without which the stain would finally wash off from the effects of rain. The calcined copperas is produced by heating green copperas in an unglazed earthen pot or pan, thus driving off its water, under which process it falls into a dry whitish powder.

As a more durable and permanent stain, however, we would suggest the following:—Take Venetian red that has been ground in pure linseed oil in stout paste form, or if the stain is to be of lighter shade a mixture of Venetian red and French yellow ocher, both ground fine in linseed oil, and beat up the paste with a small portion of a good turpentine japan to a smooth semi-paste, gradually adding in small quantities, while stirring, a mixture of one part by measure of 90-degree benzol or good solvent coal-tar naphtha and four parts by measure of turpentine, until the proper consistency of stain is had. Strain through cheese cloth and throw away the coarse particles, as these would remain on the surface and be of no benefit in sealing the pores of the brick. An excess of oil in the stain must be avoided, as it is apt to produce shiners.

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Enameling Red Pressed Brick in White.

If you wish to do a good durable job do not begin work unless the bricks have well dried out, which would be the case after a spell of dry weather. See that the walls are well dusted and prime with pure white lead in oil that has been thinned with two parts raw oil and one part turpentine. Avoid substitutes for linseed oil or turpentine and add a trifle of lampblack to your lead to turn it off the glaring white; also enough of a good liquid drier to make the priming dry in twenty-four hours. When this has dried putty up all joints and any imperfections in the surface with white lead and whiting putty, allowing this to become fairly hard before applying the next coat. Make certain that the putty is made from whiting and linseed oil, and that at least 10 per cent. of white lead has been added in its manufacture. Add enough lampblack (dry) to the putty to make it the color of the priming coat. For the second coat we would suggest the use of white lead in oil, either strictly pure or with the addition of 20 per cent. silex or silica thinned with equal parts raw linseed oil and turpentine and a moderate quantity of a good drier to insure hardening in reasonable time. It is good practice to tint the paint for this coat also with lampblack, but not as much as the priming coat, so that any laps or holidays may be noticeable and corrected. This coat should dry with a good eggshell finish and must be permitted to become firm and hard before the third coat is applied. The third coat or enamel ground is best made from pure white lead in oil, thinned to fair brushing consistency with one part of raw linseed oil, one part pale japan drier and two or

three parts turpentine, so as to dry firmly and uniformly to faint eggshell gloss. By building up the surface as here suggested you will have an elastic yet firm foundation for your enamel finish. For this you require a weatherproof enamel or porcelain white, which cannot be made without the best French zinc white and the palest hard gum varnish. If you are unable to obtain such a white finish under a guarantee from a paint manufacturer you can break up, say, five pounds of best French zinc white in oil with say, one-half pint of turpentine, run it through a strainer and mix the resulting white paint with one gallon of the palest outside body varnish, or still better, white enamel finishing varnish, either of which must be made from palest kauri gum. As this finish will spread well, it will pay you best in the end to pay a liberal price for the right goods. Being for exterior use, would suggest to abstain from blueing the enamel white, as exposure will keep it from yellowing off.

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Paint Peeling from Recently Painted Brickwork.

A painter wrote that he had painted an old brick house that had large chimneys on each gable. These started to peel from the top about five feet down, while the paint was solid everywhere else. The chimneys were repainted before starting to paint, but the paint has peeled on the face of the brick as well. Used pure white lead and linseed oil in both coats, allowing twenty days for the first coat to dry and harden before applying the second coat. Wanted to know reason for the peeling and how to overcome it. Would shellac varnish be any good? The chimneys have four flues in each gable, but one flue in use only, balance bricked up at top.

The trouble, we believe, was due to the paint being applied too soon after repointing, the lime in the mortar destroying the oil in the paint by saponification. That the paint on the face of the bricks is peeling as well does not alter the case because, when the film of the paint was broken at the joints, moisture had free ingress behind the paint, and consequently threw it off. Another thing, the bricks may have been somewhat greasy near the top of the chimney, begrimed by smoke and soot, thus being unfit for holding the paint. Then again, unless the top of the chimneys was so arranged as to shed the water from rain and snow, it also stands to reason that the paint near the top of the chimneys had to lose its hold first. Any of these causes, or all of them together, may have contributed to the peeling of the paint. Shellac varnish is of no use for trying to hold back the lime in mortar on exterior work, neither is shellac varnish proof against moisture. Wherever the chimneys were repointed they should not have been painted for at least one year, or a lime-proof composition should have been applied previous to painting with white lead and oil. If at least two coats of a solution of equal parts of zinc sulphate and water by weight had been applied previous to applying the oil paint, peeling would not have taken place. Using the solution now, after the peeled paint is removed, it is doubtful of success if the brick and mortar have absorbed some of the oil in the paint, but a wash of strong vinegar will remove any grease or soot in the bricks.

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Efflorescence on Brick and Rough Cast Walls.

Information sought as to how the efflorescence on brick and rough cast walls, commonly known as "saltpeter," can be removed and prevented from appearing after removal.

Before the so-called saltpeter can be removed successfully, it is necessary to investigate the cause of its appearance. This crystalline efflorescence is composed mostly of water soluble salts, that may have been present in the lime mortar, in the sand or in the water. The salts are often also present in bricks that are imperfectly burned or composed of inferior clay. Finally, it is possible

that these salts may find their way into the walls through moisture in the foundation. In every case it is the rule that after a short period of dry warm weather the salts come to the surface and form a whitish deposit of a granular nature. The remedy must adapt itself to the cause of the trouble. If it is caused by moisture arising from the foundation of the wall, the remedy lies in the isolation of the foundation from moisture by proper drainage, because if this is not done, the efflorescence will appear again during the first wet spells after its removal. The efflorescence in any case can be removed by brushing off with very dilute muriatic acid, to be followed by a thorough washing with clear water. This done, the surface should be protected by at least two, if not three, coats of good oil paint. If the walls are of brick, the joints should be puttied after the first or priming coat has been applied.

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Oiling Soft Brick Laid in Cement Mortar.

A painter had just completed a wall of soft sand-stock brick in three different colors, laid in cement mortar, and his architect has suggested that he give the entire surface a coat of pure linseed oil; but before doing this he would like to have our advice. The acid used when cleaning down the wall discolored the cement mortar in spots and the architect thinks that the oil will bring it back to uniformity and also brighten the dead appearance of the brick.

We very much doubt that one coat of linseed oil will make the brickwork stand out with uniform brightness, because soft bricks absorb oil like a sponge does water, and bricks are seldom of the same hardness throughout. There are usually some spots that will let the oil penetrate more than it will at other places. As to the discoloration of the cement mortar in the joints, the oil will penetrate more where the builders' acid has caused the color to change, because the mortar at those spots has been roughened by the action of the chemical and so made more absorbent. This unevenness will also have its effect on the color of the mortar and two coats of oil may be required.

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Flat Wall Paint Cracking on the Interior of Brick Walls.

A painter painted the inside walls of a bank building, which is of brick. Used a flat wall paint directly on a smooth putty coat finish, which was plastered on the brick to the depth of from one-quarter to three-eighths of an inch. The building was erected three years ago and had never been painted and the putty plaster had not cracked when he applied the flat wall finish. Now, last fall and this winter, the walls have cracked at many places and every time the wall did crack there was a report like the discharge of a heavy gun, the cracks running up and down and as deep as the putty finish, making the latter bulge out from two to three inches on both sides of each crack. Would contraction and expansion cause this and would the painting of the bricks on the outside stop the cracking?

We believe the trouble to be due to the same cause that makes paint scale on wood after being repainted repeatedly when the new coat, after drying hard, comes off clean to the wood, taking the old paint with it. The reason for this is most always found to be in the fact that the surface has not been carefully examined before being painted over because it looked solid and firm. If it had been properly tested it might have been found to be loose, having lost its cohesion. While this of course applies to exterior painting generally, it is just possible that the plaster putty had lost its hold to some extent from outside influences, such as moisture being absorbed by the bricks or through frost in the winter months, and if such be the case a thorough puttying up of the joints on the outside and subsequent painting of the walls would stop further trouble, providing the first coat were mixed with a good portion of white lead in oil, a second coat of flat

paint with sufficient oil to bind it down well, while the last coat had best be in gloss finish. The work should be done only after a long dry spell. It would be well also to have the roof and gutters looked after before proceeding with the work.

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Painting Old and New Brick Fronts.

To paint a four-story brick store front where specifications call for two coats of paint. Three stories were painted years ago while the fourth story was added last summer. Should like to make a good job with two coats, and obtain a gloss finish, especially on the new work.

There is also another small brick building to paint and the owner desires a flat finish of lasting quality in two coats. Is there a flat oil that can be mixed with paint?

You will have some trouble in obtaining a good uniform job on the four-story front if you tie yourself down to two-coat work on the new extension, as you no doubt know that bricks are more or less porous. We have never seen a good job done with two coats on unpainted bricks, whether old or new, and even on hard pressed brick three coats before the flat finish is applied have not been too many. At any rate, even where flat finish is not desired, it is essential for durability that the first or priming coat be composed of pigment and pure raw linseed oil and a small portion of drier to be well brushed into the surface and if any puttying up of joints or imperfections in the brick is to be done it should be done on the priming coat when dry, the putty to be the color of this coat. The second coat should be half flat and the addition of some white lead will give a solid job. In thinning the paste ground in oil for this coat we would suggest to use equal parts raw linseed oil and turpentine and sufficient drier, but no benzine of any kind. For a good gloss finish that will stay glossy thin your paint with first class boiled linseed oil and use as little drier as possible. If the old painted wall shows the coating of paint to be still solid and firm, which you should ascertain by close inspection, dust the surface thoroughly with a stiff broom or fiber brush and apply the paint we are suggesting for second coat on the new portion of wall and finish with the high gloss oil paint as recommended for third coat on the new wall. If the bricks on the small building have not been painted before you cannot make a solid job with two coats of paint, but of course you can try it by puttying up before applying the first coat, which should dry with a fair gloss to insure a good flat finish on the second coat. For this the paint should be made by thinning a paste ground stout in boiled linseed oil, using a good japan drier and enough pure turpentine to be of a consistency between a ready-mixed oil paint and a stain. You did not state whether the color was to be that of red brick or the buff Milwaukee or Western type, or whether the owner wanted the flat front with the joints lined.

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Repainting Soft Brick Wall Where Bricks Have Shelled.

"We do not know of anything that we could suggest because we think that shelling or chipping of painted brick is caused by the originally poor condition of the material. Our advice is:—Do not undertake to repaint the wall excepting at the owner's risk, and then only after a continued dry spell. Clean the surface well, removing all loose paint and shells of brick, then give a coat of raw linseed oil with very little pigment in it and when dry putty up with pure linseed oil and whiting putty, and after this apply a semi-flat coat of oil paint and finish in gloss or flat effect.

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Efflorescence on Brick Wall; How to Overcome.

When snowstorms in winter deposit sheets of ice on brick walls and sometimes driving rainstorms soak the bricks and produce a coat of ice on them and even sometimes in summer after heavy thunderstorms, this efflorescence, commonly called saltpeter, appears for a time, but usually disappears after a dry spell on surfaces where the sun gets in its work, but on the shady side it sometimes remains almost permanently.

In our experience we found that the only cure was to paint the walls after a long dry spell, but, of course, there is a reluctance to do this as the color of the brick is not always to be obscured by paint. Why not use heavy-bodied linseed oil, somewhat diluted with spirits of turpentine and apply two coats of this material? Waterproofing material does not always effect a cure and we think that the linseed oil and turpentine mixture will give best results, because it will keep moisture from going into the bricks, which are very prone to absorb it, and on drying out bring the efflorescence to the surface.

PAINTING CEMENT.

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Proper Treatment of Cement Surfaces—Oil and Water.

Many hastily conducted experiments have led to wrong conclusions, and it has even happened that two men, experimenting along the same lines, have come to opposing conclusions. The reason for this is that there is a difference in cement and cement surfaces, and our aim is to find, if possible, a method which will give satisfactory results in all cases.

One of the foremost authorities on cement has been painting with oil paint over cement for many years with the best results.*

All non-drying oils are more or less destructive to cement, and if the cement wall should be saturated with raw linseed oil the oil would slowly disintegrate the cement. But oil paint will dry on the surface without affecting the cement. It is held by experts that cement surfaces properly executed, **clean and dry**, are no more dangerous to oil paint than the modern wall plasters.

Undoubtedly most of the trouble is caused by the painting being done before the cement is dry. Cement dries very slowly. The opinion of men who are experts in the use of cement say that a cement wall must stand at very least over one summer before painting with oil paint can be commenced.

The first thing required is to wash the surface thoroughly with a weak solution of muriatic acid, followed with a good wash of clean water. The strength of the acid solution should be about 7 or 8 per cent. This wash will clean the surface, neutralize to a large extent the alkali and thus make, on the smooth cement surface, enough of an impression to give the paint a proper hold. The surface must then be given time to dry perfectly.

In painting, it is well to use considerably more turpentine than is ordinarily the case and very little driers. Boiled linseed oil is considered preferable to raw. For priming, the paint should be used thin, and contain so much turpentine that it is almost flat, increasing the amount of oil for succeeding coats. Each coat must be given ample time to dry before the next one is applied.

For water color or calcimine, washing with muriatic acid solution, followed by clean water, should be done if first class work is to be expected. When the surface is thoroughly dry it should be given a coat of alum size, or still better, a coat of flat paint, and when the size is dry the surface is ready for calcimining.

One painting contractor, who does a great amount of work in our Eastern skyscrapers, makes a size of equal parts of acetic acid and alum. His formula is one pound of acid, one pound of alum and two gallons of water.

P. W. Nelson, at Ohio Convention, 1908.

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Painting a Cement House.

How can the joints on a cement house, which are of a different color from the cement block, be tinted to match?

Mr. Hughes said the only thing to do was to wash the whole house with cement. He had done a large building that was cast, and the walls came out in different batches of color. They took two parts Portland cement and one part marble dust and mixed it with water. The trouble is in the application to the wall, which must be well wetted for several hours beforehand and kept wet, constantly, while the material is being applied. They had a man with a hose constantly playing it on the wall as the material was applied, and then the wall must be kept wet for at least a day longer. This would give a perfectly uniform color. The whole secret is to keep the wall wet. The longer you keep your work wet the better binder you have. You could not possibly

do it on a dry wall. The material was mixed like a good whitewash and applied with a brush. He did not think a price should be given on such work. On a scaffolding job it should be worth at least a dollar a yard. The marble dust holds the cement up.

Mr. Dewar said that in half timber houses the panels often were of different colors. He had tried cement, like Mr. Hughes, but did not use so much water, and could not get a binding job. In time it would streak on him, and would rub off on a very dry day. He used a material made in England, called Duresco, and mixed it with a petrifying liquid which he first applies to the surface with a large flat brush. Then he applies the Duresco, thinned with water to the consistency of thin cream, and adds a little of the petrifying liquid to it. It is the same color when wet as when dry. This material is sold in the United States under the name of Onresco. He also uses it on pressed brick work and makes the finest job that can be done. He uses two coats. For an extra fine job he has a man following the man who applies the color and stippling the walls. It cannot be used over oil color. The petrifying liquid will bind and harden but will not stop the crumbling of mortar joints. I have watched results and that is one secret of success. If a job you have done is not standing just right, find out why.

Canadian Convention 1906.

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The Treatment and Painting of Cement Walls.

There is, in cement, a considerable amount of alkali, which has to be counteracted before any paint is applied to the surface; also it is very essential that all work should be thoroughly dry before painting. I would prefer that the cement should stand at least six weeks to two months before painting. You all know how cement acts on the paint by eating through and softening the paint and turning it into a very gummy substance first, so that if a good, heavy rain-storm should beat against it, it would be washed off in a great many places. My way of treating cement:—In the first place, I take about half a bushel of alum lime to twenty-five gallons of water and thoroughly shake the same; when cold add six gallons of the best cider vinegar and about five pounds of English Venetian red; strain through a fine strainer, use it about the consistency of thin cream. Apply one coat of this to your cement work; let it stand at least twenty-four hours, so that it may become good and hard. Then give it one good coat of red lead and linseed oil, with enough of japan drier to dry the same. The same may then be painted any color desired.

I have met with very satisfactory results with this method of treating cement for painting.

Thomas Gwilliam.

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Painting Concrete Building Blocks.

We have repeatedly called attention of interested parties through these columns to the fact that cemented surfaces or concrete cannot be coated with paint or enamel or any other preparation until the caustic properties in the cement have been neutralized by age, which requires from one to two years' time. As no one, however, will wait for this to occur naturally, the best means to accomplish this effect artificially and on comparatively fresh cement is to sponge the surface with a solution of twelve fluid ounces oil of vitriol in one gallon of soft water. This will neutralize any caustic lime that is present in the cemented surface and turn it into the inert sulphate of lime (gypsum). It also roughens the surface, giving the oil or paint a better grip, so that succeeding coats will obtain a firm hold. When the cement is a month or so old, the dilute acid wash can be dispensed with and a solution of four ounces of bicarbonate of ammonia in two gallons of water used in its place, in which case the surface need not be rinsed with clear water, but may be painted upon as soon as it is dry. In order to exclude moisture, the best plan is to prime the surface treated as above with good old raw linseed oil, giving it ample time to become

hard. Upon this coat of oil, which should be applied liberally to stop suction, a coat of flat paint, composed of the necessary pigments, linseed oil, turpentine and japan drier, should be given, and if this shows up unevenly, another coat of the same paint and finally a finishing coat of weatherproof gloss paint or enamel, made of good pigments and exterior varnish. This treatment is certain to keep out moisture and is of course intended for concrete blocks that are not colored, but made in the natural color of cement. For colored concrete blocks, where it is desired to preserve the original color and which, as a matter of course, are not to be painted, one part of water glass (silicate of soda, concentrated), is to be mixed with three parts of rain water. When this is applied to the cemented surface, it decomposes any lime that may be present and converts it into silicate, and while the color becomes somewhat darker, the surface acquires a hardness which resists the action of the weather and keeps out moisture.

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Painting a Cement Front in Oil Finish.

A three-story business house, which is built of cement blocks, was to be painted, and the painter asked us to advise him of the best and cheapest method. He would like to put on a paint that is durable in the damp climate of his locality.

Before painting cement surfaces it is necessary to treat them so that oil paints or enamels will not be affected by the caustic properties of the cement, and such treatment is particularly necessary whenever the cement is comparatively fresh. For hot cement walls, that is, when they are less than six weeks old, a dilute sulphuric acid wash should be given; that is, to one gallon of soft water twelve fluid ounces of commercial oil of vitriol should be added, and after standing for about one hour in an earthen, stone or leaden vessel, the solution should be applied with a swab made of cotton fiber or with a fiber brush to all of the surface that is to be painted. When apparently dry, repeat the operation and let it stand for a day, then rinse the surface thoroughly with clear water and let it dry. If the cemented surface has been exposed, say, two months or more, the sulphuric acid wash may be dispensed with and a wash made by dissolving four ounces of bicarbonate of ammonia in two gallons of water applied instead. After either of these treatments a priming coat of raw linseed oil with or without pigment should be given and the older the oil the better for the purpose. Upon this priming any good linseed oil paint that is designed for exterior work will stand well, but in a damp climate especially each coat of paint must be permitted to dry most thoroughly before applying another, or peeling will be the result. Therefore only the priming should be all oil, while succeeding coats should contain a moderate quantity of turpentine and drier.

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Painting Cement Floors.

If the cement floor is of comparative recent construction, that is, not over a few months old, you must apply a wash made of twelve fluid ounces of oil of vitriol (sulphuric acid of 66 degrees Be.) and one gallon of water. This must be mixed in an earthen or glass vessel and allowed to cool, then applied on the cemented surface by means of a large fiber brush or a swab made of cotton waste; a hair brush would be ruined. This treatment will change any caustic lime that may be present in the cement into the harmless sulphate of lime (gypsum) and at the same time it roughens the surface so as to make the paint hold on well.

Twenty-four hours after the wash has been applied, a priming of well-settled raw linseed oil (well aged, if possible) should be given, and if there is no especial haste this should be permitted to stand a full week, after which a coat of good linseed oil paint, preferably with pure lead and zinc base, should be

applied and well rubbed in, finishing with a hard-drying floor paint. If such a floor paint is to be of lead color or spruce color, it is best made on a base of equal parts of lead and zinc in oil, thinned with equal parts of turpentine and japan to brushing consistency, tinted to suit requirements, and then mixed equal parts by measure with hard-drying floor varnish of approved quality. Thus treated, a cement floor will permit the paint to wear well, even where oil is spilled over it, as in the case in engine rooms and similar places.

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Painting the Cement Walls of the Operating Room in a Hospital in Washable White.

A painter had a contract to finish the cement walls of the operating room in a hospital in washable gloss white. He did not know the composition of the cement, but proposed to apply two coats of zinc in damar varnish and then one heavy coat of spar varnish with enough zinc in it to remove the yellow cast of the varnish. He wanted advice whether this was a good plan.

The plan is a good one, as far as the finish is concerned, but we are not agreed as to the ground work. The finish would be apt to crack in a short time, as the walls become older, because zinc in damar varnish makes too brittle a foundation. We would suggest that the walls be given a priming coat of pure white lead in oil, thinned with raw linseed oil and a trifle of japan. This prime should not contain over ten pounds of white lead to one gallon of raw oil. The next coat should be zinc white ground in oil, thinned with equal parts of raw linseed oil and turpentine, with enough pale drier to harden in a reasonable time. Then one coat of zinc, ground in damar varnish, thinned with turpentine only, so as to dry nearly flat. As a finishing coat, a good pale hard gum varnish (spar varnish of approved quality will do), to which is added enough zinc in damar varnish and a trifle of ultramarine blue to overcome the yellow cast of the spar varnish. The extra coat suggested for priming the walls is necessary and it will pay you to use it, even if the cost is in excess of your original estimate, because your second coat will go so much farther and you will save your reputation.

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Painting an Artificial Stone Stairway.

Three or four months before writing, the questioner had painted an artificial stone stairway, that had been painted several times before, in white, using for first coat pure white lead, thinned with two-thirds turpentine and one-third raw oil and a little drier. After forty-eight hours he put on second coat of pure lead, thinned with turpentine, drier and damar varnish, no oil at all used in thinning. After two weeks it was still tacky, yet the material was all bought as first class. The owner of the house said that they have always had trouble with those stairs. Wants to know reason of trouble and the remedy.

While you made a good start in painting that stairway, you ended badly. Whoever told you that damar varnish and lead in oil would ever dry hard? Or even if it did dry finally, that it would serve as a paint for a stairway, no matter of what material it be composed? The very best and hardest drying varnish is none too good for such a job, and at best will not wear any too well or too long on a stairway. When you tackle this job again, have all of the surface well cleansed with soap and water, to which add a few drops of ammonia, and when dry knock off any lumps or loose paint with coarse sandpaper. Give a first coat of pure lead in oil, thinned equal parts oil and turpentine, adding a good portion of drying japan. Have this paint stout, but brush out well and good. Give this coat forty-eight hours, and if not inconvenient seventy-two hours. For second coat use flake white or white lead, ground in gold size japan, thinning with turps and adding a little pale rubbing varnish. Let this stand at least twenty-four hours. For the finish in pure white, use

French zinc, ground in damar varnish; reduce it to a semi-paste with turpentine and thin to consistency of stout varnish with a high grade of pale rubbing varnish, one that is guaranteed to rub in twenty-four hours. After forty-eight hours, if you wish to make an extra fine job, you can moss this down with pumice and rubbing oil or water, and although it cannot be guaranteed to stand for years, it will at least not catch the dust and dirt and can be kept clean.

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Painting a Swimming Pool of Concrete in White.

What is best to use for painting a swimming pool of concrete in white, that has been painted with white lead before?

Have the surface thoroughly dry and well cleaned. Brush off all loose paint and mix two-thirds lead and one-third zinc white with raw linseed oil and sufficient japan drier to make it dry in twenty-four hours. If this makes a good groundwork, use pure zinc white, thinned with turpentine to the consistency of cream, and add sufficient hard gum varnish of pale color to produce a fair gloss. If this does not cover sufficiently, apply another coat of same mixture.

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Size for Cement Blocks to Be Painted.

A firm wrote:—We ordered a barrel of liquid glass from a firm in Indiana, and instead received silicated soda. The people we ordered the liquid glass for used the soda on cement blocks outside, and the first rain that came along washed almost all the soda off, so that the suction was almost as great as before. Then they painted over it with lead and oil paint, which became perfectly dry, but the next shower had the same effect on the paint as a remover on varnish, washing the paint off. We were sent for to fix up matters, and removed all the paint we could possibly get off and tried a thin coat of paint on several blocks and it adhered well until water was sprayed on, when they turned white and the paint came off like ordinary whitewash. We should consider it a lasting favor should you advise us what to do.

That firm sent you exactly what you ordered for liquid glass. The chemical name for liquid glass, also known as water glass, is sodium silicate; the commercial name is silicate of soda. This material is unfit for stopping the suction in cement or concrete surfaces which are to be painted. A saturated solution of sulphate of zinc in water, although it has been used largely in Europe for hardening plaster, has been found best for preparing cement surfaces by one of the prominent master painters of Washington, D. C., Charles Macnichol, who has been experimenting along this line for several years. For comparatively new cement equal parts by weight of zinc sulphate and water are mixed, and when the chemical is dissolved the solution is applied as a wash and at least three days are permitted to elapse before paint is applied. The solution neutralizes the hydrated lime in the cement, and by chemical reaction forms a combination of hydrated zinc oxide and sulphate of calcium, which is harmless to oil paint. If the concrete or cement blocks have been exposed to the weather for a few months and their surface is rather sandy and porous, a coat of neutral (mineral) oil or paraffine oil will serve the purpose best, because these are non-saponifiable, and if they dry dead flat the oil paint will adhere very well; but they must not be made use of on smooth hard cement, as in that case they will throw off the paint. We suggest that you remove every trace of the silicate of soda by a thorough flushing with water, and if needs be by scrubbing the surface before applying the solution of zinc sulphate. You can obtain the zinc sulphate from any wholesale drug house in Minneapolis or St. Paul.

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Waterproofing Exterior of Cement Walls.

To coat the exterior of the walls with a waterproofing solution that will not change the color of the blocks.

We believe the best method is to apply a first coat or wash of equal parts by weight of zinc sulphate and water in solution, which is best applied with a paint spraying machine. This will, to some extent, stop the suction in the cement and make it much more resisting to water, hardening the surface also. But it alone will not make it impervious to moisture. A coat of sodium silicate (waterglass, soluble glass), which can be bought in liquid form in the consistency of syrup, and is made more liquid by the addition of clear water, is applied with a paint spraying machine, and will effectively stop moisture from entering into the cement. Try it on a cement block first before going over all, and if one coat of waterglass will not answer apply a second one. Dilute silicate of soda of 33 degrees Be. to a consistency that will work well in the spray and see that the coating is applied uniformly. The work should be done in dry weather and in a temperature not below 50 degrees F., allowing at least 48 hours between the application of the zinc sulphate wash and the application of the first coat of waterglass. If a second coat of the latter is found necessary it can be applied as soon as the first has well set, but it is best to give twenty-four hours between coats. If the concrete blocks have been prepared originally with a solution of zinc sulphate, as is often the case, the zinc sulphate wash can be dispensed with and the waterglass alone will be sufficient to keep out moisture. You can probably ascertain this from the manufacturer of the cement blocks.

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Dust Laying Compounds for Use on Cement Floors.

What are the dust laying compounds used on cement floors composed of?

The best we know of is to mix 25 pounds white lead in oil, 10 pounds yellow ocher in oil and one pound lampblack in oil, adding about one quart raw linseed oil, beating all into one homogeneous mass and while stirring it constantly add 1½ gallons kerosene oil of 150 degrees and one-half gallon of the lime solution, as given below, let it stand about 30 minutes, then add from one quart to half gallon brown japan and one quart fat linseed oil. This will make 3½ gallons of a coating to keep down the dust and is unaffected by the cement, and when worn somewhat any good flour paint may be applied over it without being affected by any causticity in the cement. The lime solution is prepared as follows:—Pour three gallons hot water over 11 pounds of quick lime, which is in a suitable vessel, cover this with burlap or a sack to keep in the steam and let stand over night. Then decant the water and strain through several thicknesses of cheese cloth and bottle for use as above.

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Safe Pigments for Coloring Cement.

Colors that are considered safe to color cement for the manufacture of colored tiles, pigments that are unaffected by the constituents in cement.

The following are absolutely proof against change in this connection:—For buff, yellow ocher; for light yellow, zinc yellow (zinc chromate); for red, red ocher or red oxide of iron; for blue, ultramarine blue (the sulphate ultramarine preferably); for green, ultramarine green or oxide of chromium green; for white, zinc oxide or zinc sulphide (lithopone); for black, mineral black, black oxide of manganese, black oxide of iron; for gray, graphite and lithopone, or lithopone and mineral black.

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Painted Walls in Concrete Building Spotting.

The interior walls of a bank building of fireproof concrete construction has been frescoed. The walls had five coats of paint, first coat being lead in oil, and last coat wax and stippled. No glue size was used. A recent fire in an adjoining building caused the bank building to be filled with smoke and the basement had several inches of water. Fire spots showed on the frescoed walls. Were spots due to smoke or water in basement or the natural dampness, the ventilation being rather artificial?

It is hardly probable that the smoke would cause the spots, as it would discolor the walls all over, and we are rather inclined to think that the spots are due to moisture, not so much from the water in the basement, but from the outside of the walls. It would strike us that great volumes of water were thrown against the walls on the outside, and as concrete constructions are not always uniform and are more porous in one place than in another, that moisture came through at those spots, dissolving whatever lime may be present in the cement and in the plaster, which would produce an alkaline reaction on the paint. The water that was in the basement no doubt trickled through the foundation wall from the other building, but it would hardly soak into the wall and rise as high as the frescoed portions. By observing future appearance of the spots you can ascertain whether they are caused by moisture solely or by lime. The moisture will make the paint soft and apt to peel, while the lime would destroy the color of the tint or if it is white, would make the paint flake or powder, as it would destroy the binder.

ROOF PAINTING.

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Repainting Creosote Stained Shingle Roofs.

Can a shingle roof that has been stained with a creosote stain be painted successfully with an oil paint? If not, what is best for repainting? The stain has been on four years at least, and shows the effects of the weather. The house stands in an exposed place where storms have free access, from the south and west especially.

We believe that we are pretty safe in saying that any tarry matter that may have been in the stain originally used on the shingles has by this time lost all power to do any harm to oil paint that may be applied to the shingles now. In fact, when shingles are coated with creosote stains and have been laid for a year, they may be gone over with any good oil paint without harm to the latter so far as holding on comes into question. As to whether a light oil paint placed over shingles coated with dark creosote stain would not show up spotted or streaked on drying depends to a certain extent on the composition of the original stain and on length of time exposed. Inasmuch as you say the shingles to be repainted in the case referred to show the effects of the weather, we would suggest that you use a stout oil paint of the desired color, thinning it with creosote, gallon for gallon, thus adding to the preservation of the wood.

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Oiling California Red Cedar Shingles Without Changing the Color of the Wood.

Dead oil of tar or coal-tar creosote is without doubt the best for preventing dry rot in any shingle and will not change the color of the wood any more than would paraffine or other mineral oils. Any oil will change the color of the wood somewhat at first, even kerosene will do it. But all of these oils will penetrate into the wood and allow the outer surface to resume its natural color. Linseed and other drying oils differ in that respect, as they oxidize on the outer surface, leaving a film which, no matter how thin, gives a different, mostly darker, color to the wood.

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Canvas Roofs.

Mr. Akin told of a canvas roof put on sixty years ago. The under surface, on which it is laid, was painted and allowed to get thoroughly dry. The canvas was then stretched and sprinkled with salt water, and then painted; and it has lasted very well.

Mr. Moore said that at Kennebunkport the piazza roofs were made of matched boards, covered with canvas (an eight-ounce duck), fastened with galvanized carpet tacks. They turned the hose on the canvas, and then painted it. In one case the architect would not let them wet the canvas, and the roof leaked. They made a test of two frames, one with the paint applied to wetted canvas, the other on dry canvas. In the latter (under the microscope) there was seen a little hole over every fiber of the duck. Over the canvas that had been wetted there was a perfect paint film.

Massachusetts Convention, 1908.

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Mineral Roof Paint Peeling and Scaling.

A Denver painter wrote in substance as follows:—Last June we painted a large tin roof which has a pitch in all directions, north, south, east and west. Three coats of a gray mineral paint mixed with linseed oil were applied. Now (October) the paint is scaling off in large and small blotches all over the east side of the roof, while on the other sides it is scarcely noticeable, and the peculiar part of the whole matter is that only the last coat is peeling, while the other two coats are solid. The whole roof looks as if the oil had been boiled out of the paint, lifeless, as if it had been on for years. Weather was dry and hot when work was done. We inclose sample of the gray mineral, also a number of the scales. Please inform us of your opinion as to the cause of the trouble and the probable reason why it peeled on the east side and not on the others.

We have very thoroughly examined the gray mineral paint as well as the peeling and scales sent us, and have come to the following conclusions:—While your gray slate paint is a perfectly inert material, it is not an ideal pigment to put on a tin roof because it is of brittle nature, even more brittle than yellow ocher, which contains enough iron oxide to impart some elasticity to the paint. Nor has your material any carbon among its constituents; it is simply stone and of a purely silicious nature, a pigment that has no affinity whatever for linseed oil. When such paint is applied, the oil must of necessity float to the surface, and unless brushed out to the utmost, will have an effect on succeeding coats, as may be plainly seen on the scales you sent us. On closely examining these it is to be noted that the film of paint represented by them has badly wrinkled, or, in other words, the last coat has crawled, as oil paint or varnish will over an imperfectly dried previous coating. Furthermore, the film appears to be rather heavy, as if this coat was applied entirely too stout or at least not rubbed out enough. There is absolutely nothing in this gray mineral to reinforce the elasticity of the oil and impart life to the paint, and as a preventive of similar trouble, would suggest that if for economy's sake you desire to use this material in future for tin roofs or other exterior work and wish to retain the shade, to add some pure white lead and lampblack, which will not increase the cost in the long run, as you can do better and safer work with two coats of such paint than with three coats of the paint you have used. But above all, when painting a tin roof three coats, do not have the paint mixed alike oily for all of the coats, but make your second coat less oily than the first and third coats and have them all well rubbed out.

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Durable Stain for Shingles.

We take it for granted, in considering this, that you do not consider first cost, but that you wish to prepare oil stains that will wear well and will not fade or look unsightly for a reasonable period. We would point out that a pigment stain is the most durable in point of permanency, and that aniline colors had better be avoided. If the shingles are for roofs from which water is to be collected into cisterns for drinking purposes colors with lead or copper bases should not enter into the stains in quantity. To make the stain use earth or mineral colors chiefly that are ground to the utmost degree of fineness, as these only will hold up well in a stain and thereby effect a very decided saving in the final cost. If the stain is wanted for dipping the shingles into, all that is necessary is to break up the oil color or oil colors with equal parts of boiled linseed oil and liquid dryer, then thin to the consistency of water with benzine, and keep the stain well stirred while dipping the shingles. For brush work, treat the colors in a similar manner, but thin with turpentine and have the stain somewhat heavier. The principal point about a stain is to use as little pigment or color as possible, but have that little of greatest possible staining power. Accurate figures cannot be given; proportions must be ascertained

by practice. The red and brown oxides, umbers, siennas and Vandyke brown are best adapted for yellow, brown and red stains. For the various green tones mixtures of lampblack or umber, strong ocher and Prussian blue had best be used, and chrome yellows and chrome greens be omitted for reasons given above.

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The Best Paint for a Tin Roof.

We have referred this question to a thoroughly experienced painter, who says:—"There is a great diversity of opinion on this subject, and it is a difficult task to give an impartial answer. Metallic brown has been the orthodox material for roof painting these many years, and it has given the utmost satisfaction wherever I have employed it, providing the roofs were in fit condition to be painted. Failures with metallic brown cannot often be laid at the door of this material, but must be looked for in the thinners, or in the bad condition of the tin. Rust once formed cannot be arrested by a coat of paint, no matter how good that paint may be, nor can it be expected that the thinning of a good pigment with rosin or mineral oil or other substitutes for linseed oil will tend towards the longevity of the paint under any conditions. Any one who knows what trash some tin roofers employ for first coating new roofs will not be surprised when the best of material gives way.

"I have tried Venetian red and have had as good results as from metallic brown, but I have always used standard brands, ground in paste form by reputable manufacturers, never any snide stuff that was loaded with barytes or other worthless base, such as marble dust or clay. Have also used graphite, but this has been so recent that I cannot pass an opinion as to the probable outcome. A brother painter is very enthusiastic on the subject of liquid coal tar for tin roofs and points with pride to some jobs that he did with coal tar, with which he mixed some heavy boiled linseed oil, thinning with heavy naphtha, but the jobs are rather young yet, not over a year old, at most."

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The Kind of Oil Best Suited for Mixing Paint for Tin Roofs.

Unless you can obtain good heavy bodied kettle boiled linseed oil, we should strongly advise you to use nothing but pure raw linseed oil, to which add a half pint of good oil drier in winter and a quarter pint in summer for every gallon of oil. Do not use turps, benzine or gasoline for thinning if you want the roof well protected, and avoid the use of rosin or mineral oils.

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Fire-Resisting Wash for Shingles.

We quote the following from the Scientific American of several years ago:—Dissolve in a barrel of hot water 20 pounds of zinc sulphate, 20 pounds of powdered alum, 8 pounds of caustic potash, 8 pounds of oxide of manganese, and add 8 pounds of oil of vitriol. Pack the shingles loosely into another barrel and fill up with the liquid, keeping the shingles under the mixture by means of a weighted cover. Fill the first barrel also with shingles, and allow them to soak for several hours, then take them out and pile away to dry. Repeat this operation until all the shingles are impregnated with the mixture. Use rubber gloves for handling the shingles, and when laid on the roof coat them with a suitable oxide of iron paint.

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Graphite Paint for Tin Roofs.

Wanted to know whether graphite paint is more protective for tin roofs than mineral brown or red paint, provided the pigment in each case is ground in and thinned with pure linseed oil and the minimum of dryer for application.

The question is a difficult one to answer, as it depends a great deal on the purity and composition of the pigment. There are many so-called graphite paints that are no better than bituminous coal, while some are made from the purest natural graphite and some brands are made from artificial graphite. Then there are mineral brown or red roof paints that may last for years on wooden or shingle roofs, but if applied to tin would permit it to rust in less than one year's time. Poor qualities of graphite or mineral brown and red are disastrous to the oil with which they are mixed, inasmuch as they contain earthy matter of alkaline or sandy nature or free sulphur in sufficient percentage to destroy the binding and wearing properties of the medium.

For many years it was generally conceded that graphite paint was the best paint for the protection of tin roofs, but of late years opinions have differed much on that point, a prominent tin plate manufacturer taking the ground that a galvanic action is produced between the carbon of the graphite and the tin that acts destructively upon the iron. In reply to this a well known manufacturer of graphite paint says:—

There has been of late a good deal brought out with regard to the tendency of different pigments to increase the corrosion of iron or steel plate. It is perhaps so, that carbon shows a more stimulating action so far as a laboratory test is concerned. We have made some tests ourselves, and while the results are not entirely confirmatory, there are indications in this direction. But the success of graphite paint is based, not upon laboratory experiments, but upon actual service. We think that it is a fact that at the present time graphite and carbon as a paint pigment stands in the very first rank so far as their use as a pigment for protective coatings is concerned, but the essential thing to be considered is, not only whether graphite actually accelerates corrosion when lying in contact with iron and steel in connection with moisture, but whether the paint film when formed of a proper thickness, is a more durable one than when made with other pigments. We think it is a fair statement to make that corrosion on any structure is the result of a wearing away or a destruction of the paint film itself.

Proper care is not taken to inspect the coating and to provide for repainting at proper times, with the result that the paint covering has often disappeared and corrosion sets in before repainting is resorted to. There is no question whatever about the extreme durability of the carbonaceous coatings. We don't think anyone questions the fact that so far as the durability of the paint skin itself is concerned that they stand away ahead of paints made with other pigments.

Probably the one great weakness of graphite paints is the fact that they are spread out easily, and when a painter runs against them for the first time he observes that they are apparently very heavy and he immediately proceeds to add some thinner, and, of course, under these circumstances he gets such results that the manufacturer tries to provide against. When he makes his paint so heavy the painter goes on thinning and he secures a coating which may be only one-half as thick as he would have secured had he applied an iron oxide paint. The manufacturer of graphite paint never had any trouble whatever with tin roofs until the manufacture of tin plate was developed in this country. There is undoubtedly a good deal of pretty fair tin plate made in this country and there is a great deal that is unfit for service. The fact that a large number of the complaints made may be laid to the tin plate itself is evidenced by the fact that on a roof you will find perhaps an equal number of plates which show no sign whatever of corrosion intermixed with an equal number which are very badly pitted. Such a condition as this can only be explained by a lack of uniformity and the quality of the plates themselves. But to anyone who has a doubt on this matter of painting tin roofs there is a course open which should be entirely satisfactory. Let him first paint the tin with a coating of paint containing an oxide of some metals,

red lead or iron oxide. Then let him protect that with a coating of graphite or carbonaceous paint. After this has been done there can be no trouble whatever about his securing a satisfactory result.

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Repainting Tar-Coated Roofs with Oil Paint.

Oil paint can be applied over tar when the tar coat has become hard, but it is very bad practice, because coal tar never becomes thoroughly dry and even if apparently dry the oil paint appears to soften the tar, and the tar strikes through the oil paint, especially when the sun gets in its work. Not only does the tar strike through, making the new coat look badly, but it makes it part in furrows, like alligator skin many times magnified, thereby exposing the surface to the weather. While in some cases where coal tar has been refined and mixed with asphaltum, pigment and linseed oil, such material has given fair service on tin roofs, ordinary coal tar has failed every time. We would advise you to adhere to oil paint for painting roofs and not undertake a job of painting over tar or to repaint with oil paint a roof where tar has failed unless every trace of the tar has been removed, as well as rust spots that may be present.

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Coating Tin Roofs with Coal Tar.

The best treatment for a tin roof that has been coated with coal tar for some time. The tar cannot be removed because its removal would open up leaks where the tin has rusted badly. Oil paint has been tried, but will not adhere to the tar. In some places the tar is one-eighth of an inch thick, in other places the tin is bare. The tar on drying crawled in bunches and on hot days the sun softens the tar.

The best remedy would be a new roof, and if the roof is a flat one, a gravel and tar on top of this without removing the tin would be best. However, if the roof is gabled or if gravel roofs are not in use in that locality or if the owner does not want to go to the expense of a new roof, the very best thing to do is to wait until the tar becomes hard and then go over the roof with a stiff broom, removing whatever loose dried-up tar may be there. Then coat the bare spots on the roof with liquid coal tar, to every gallon of which add one-fourth pound air-slaked lime (quicklime that has been permitted to fall into powder by exposure to the air and is then sifted) and two ounces of dry soda ash or pearl ash. Stir thoroughly and if the coal tar is too heavy thin with coal tar naphtha or turpentine. Do not use benzine or gasoline for thinning, as that makes it too brittle. Instead of one heavy coat, apply two thin coats. If some of this gets on the old tar it does not matter, as you can hardly spoil the appearance of the roof now.

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Artificial Coloring of Roofing Slate.

Particulars wanted of English patented process for the artificial coloring of roofing slate which is said to give very permanent results.

We believe that the patent you refer to was issued in 1905, under No. 15753, by the British patent office, to a certain Sydney Kellett, whose process consists of depositing iron salts or other metal salts upon the surface of slate. All metals that, like chromium, for instance, contain colored oxides, or which, with slate under the influence of heat, produce the desired colors, are of the proper nature for the work. By calcination the desired shades of red, green, yellow, etc., are obtainable. For instance, iron or oxide of iron are dissolved in nitric acid or hydrochloric acid, hydrofluoric acid or acetic acid, or the iron salts of such acids, the waste products or by-products of chemical works, are applied

direct upon the slate in the form of watery solutions. The slates so impregnated are placed in gas or coke ovens in upright position or in loose layers on suitable iron trays. The heat of the oven must be uniform in all parts thereof, and the temperature must be regulated by means of ventilators, according to the nature of the metallic salt that is being used. Finally the slate is gradually and slowly allowed to cool or anneal. In many cases the slates may be heated to the highest degree, but here the cooling must take place very slowly, so that the salts oxidize most thoroughly. This process produces a color upon the slate, that still retains the dull original effect, unlike that of glazed tile or glazed brick.

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Painting a Metal Roof in White.

To paint a tin roof white that is coated with metallic brown.

When a tin roof is painted white it is usually done to deflect the rays of the sun, so as to have the space below the roof somewhat cooler than when a dark paint has been employed. You cannot, however, expect to produce a well covered white job with one coat of white lead paint, even if made from pure lead and linseed oil. However, our advice is that you use pure white lead in oil as the basis of your paint, omitting zinc white as being too brittle, and if pure white lead paint strikes you as too high in cost, add whiting and barytes as cheapeners, but not in excess. Ten per cent. whiting and 20 per cent. barytes should be the limit. Use pure raw linseed oil only with very little drier and only enough turpentine or turps substitute to make the paint work freely. Brush the roof well with a stiff broom, so as to remove all that is loose of the brown paint, and add to your white paint for first coat a trifle of lampblack to make it a light lead color, upon which the second coat of paint will stand out a pure white. Unless you follow this advice you cannot make a good white job with two coats of white lead paint, even if pure lead.

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Paint Peeling from a Tin Roof.

C. A. A., Richmond, Me., writes: A house built about sixteen years had a large piazza the roof of which is covered with the best quality of tin. The roof was not painted until one month after its being placed in position. After standing about one year another coat of paint was applied; after three years it received one more coat, pure lead and oil being used each time. Then, after a lapse of four or five years, two coats were applied, and this appeared nice and smooth until about one year ago, when it began to peel, and now it does look bad, the edges of the paint having rolled up like shavings from a plane.

The trouble would appear to be due to the last painting, because at that time the old paint should have been examined to ascertain whether it was still adhesive and firm enough to permit more coatings of paint to be applied over it. It stands to reason that when paint is applied to tin, which is not absorbent, like wood, the ground or priming coat has not the same hold as it would have on wood, and being exposed to the sun and all sorts of atmospheric conditions, the metal contracts and expands alternately, as the case may be, thus weakening the hold of the dried-up paint film. For a time, when fresh coats of paint, as you state, were applied at shorter intervals, the new paint gave up some of its life to the old coating underneath, but when four or five years passed, before the two coats were applied, the third coat, that had been given three years previously, must have become somewhat brittle or at least have lost some of its adhesiveness, especially as it had, no doubt, imparted some of its oil to the older coats. The owner can congratulate himself if the roof is not so badly corroded as to make it necessary to replace it instead of simply taking off the perished paint previous to repainting. If the tin is still in fair condition, the best thing to do is to scrape off all the old paint or remove it with paint resolvent, cleaning it thoroughly by

rinsing with plenty of clear water in the latter case, and applying new paint as soon as dry. We do not believe in the old theory of letting tin or other metal rust before painting.

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Painting Tin Roofs and Conductors.

In painting tin roofs the practice followed is to suit the conditions. On large roofs long-handled flat brushes six inches wide are usually employed, while on small gable roofs ordinary four-inch or five-inch flat wall brushes serve the purpose. Two coats of a good oxide of iron red or brown oil paint with little drier are deemed sufficient for any tin roof that is new or in fair condition. As to the painting of the conductors in imitation of oxidized copper (known as patina), would say that if the tin has had one coat of oxide of iron red paint, you can go over this with a thin coating of raw Turkey umber in boiled oil and some drying japan, using turps to keep down the gloss. If this is put on light, so that the red is slightly visible, it will resemble old copper. Follow this up with a glaze, prepared by thinning French verdigris in oil with equal parts of turps and spar or outside varnish. This glaze is applied in such a manner that the green patina effect given by the verdigris does not show solid, but only as high lights. A still richer effect may be had by using copper bronze over the red paint, mixing the bronze with a liquid made from exterior varnish and turpentine. When dry, stipple the bronze coat with French verdigris glaze prepared as above.

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Graphite (or Plumbago) Paint for Tin Roofs.

For tin roofs, it is a debatable question whether graphite or plumbago paint is a safe material to use. Experts differ very much in their opinion, but, after all, we believe that it depends a great deal upon the purity of the pigment and oil, as well as on the quality of the tin. We know from experience that a graphite consisting of 65 to 70 per cent. pure carbon with a natural gangue of from 30 to 35 per cent. silicates (silicate of magnesia and silicate of alumina combined) ground in and thinned with its own weight of pure raw linseed oil, and an addition of 5 per cent. good oil driers has given excellent wear on iron roofs and sidings; also on galvanized iron sheathings exposed to the weather, but do not know whether the same would stand as well on any tin roof. Graphite paint in oil is usually a little darker than dark slate color. We have known ready mixed paint of slate color made of pure lead and zinc, tinted with lampblack, to wear very well on tin roofs.

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Paint for Roofs Laid in Rubberoid Roofing.

So long as a red or brown oil paint that is not too oily on first coat and of full body on second coat is applied, we believe it is merely a matter of taste and cost, whether to use the oil paint or a good asphaltum and tar preparation. Our individual taste would lead us to prefer the Venetian red and raw linseed oil paint with only enough drier to make the paint set up well in reasonable time, say twenty-four hours, using some turpentine in the first coat to prevent the tar in the rubberoid material from striking through to too great an extent, which tends to discoloration and slowing up the drying of the oil paint. At any rate, where the roof has already had two coats of Venetian red and linseed oil paint it would hardly be wise to coat it over with tar paint. So far as we have seen rubberoid is made by running felt roofing paper in long rolls through a bath of

hot coal tar and asphaltum, and on coming out of the bath and before going to a set of cylindrical rollers, soapstone or talc flour is sprinkled over the roll, which in passing through the rollers becomes sufficiently dry to be handled.

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Liquid Coal-Tar Paint for Tin Roofs.

If you wish to have your tin roofs corrode quickly, apply liquid coal-tar paints, either on new or old tin, as the acid of the coal-tar will do the work in short order. A good asphaltum paint, made from genuine asphaltum gum, without being mixed with coal-tar products, and with sufficient linseed oil during the melting process, will not affect or corrode tin, but the best protection for tin is a linseed oil paint made from metallic red or brown pigment.

PAINTING IRON AND METAL WORK.

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Mixing Red Lead for Painting Structural Iron.

Should dry red lead be mixed first with water, before putting in oil and driers? This is said to be the practice of the paint department of a prominent railroad company for painting bridges, etc.

If such is the case we have never heard of it, and do not see the advantage of such mixture. In his book entitled "Rustless Coating," M. B. Wood distinctly condemns such a practice and gives an instance showing that where this was done the red lead utterly failed to protect the metal from corrosion. We have known instances where the mates of British ships have bought red lead, ground in oil in paste form, and stirred into every 100 pounds of this paste from one to two gallons of water, with the avowed purpose to keep it soft during the voyage, a result which was accomplished in at least one case that came under our observation. But then, it was unwise to purchase red lead, as a cheap Venetian red paint would have protected equally as well. It has been demonstrated time and again that red lead should either be ground within 48 hours of the time of its being applied or should be mixed on the spot and applied as quickly as possible, at least within 24 hours after mixing. The dry red lead should be so fine as to require no grinding in oil, but simply going through a paint strainer after mixing. When pure red lead in oil is mixed with well-settled raw linseed oil and no driers at all, strained and immediately applied to iron or steel structures, it will produce a cement-like yet elastic paint film, that after a few days will require a sharp instrument to remove, while after standing a while the same paint requires the addition of driers to become hard and when hard it does not cling to the metal as well.

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Red Lead Priming for Iron and Steel Parts of Street Cars.

In our experience we have always found that pure red lead and linseed oil applied to clean iron or steel afforded the best and surest protection against rust, provided it was mixed immediately before application and applied to the metal in workmanlike manner in two coats, so that every part of the metal is covered. Wherever red lead and linseed oil has failed to protect metal against rust, it was due to one of the following causes:—Loose scale or incipient rust, insufficient covering or careless workmanship, inferior or adulterated red lead, impure oil or excessive addition of drier. Pure red lead and pure raw linseed oil mixed and applied in the manner stated will form a cement-like coating on the metal, non-porous and hard enough to keep from the metal all moisture and other rust-producing agencies.

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Mixing Red Lead So as to Adhere to Metal Surface.

A method of mixing red lead was wanted, so that when it is applied to the bottom and hulls of iron and steel vessels it will stick and stay there. As it cannot be mixed on the spot for each day's work, the painter is compelled to mix a ton at a time ahead and use it on the next favorable opportunity that comes along.

You can do it with a fine grade of dry red lead, by mixing it with pure, well settled raw linseed oil, to fairly stout consistency, covering the tubs with burlap or bagging to exclude the air to prevent oxidation. Stir the material again daily until it is to be used, covering it up well after each stirring. Then if the job is to be hurried, the tub of mixed red lead that is to be used first should have added to it a strictly oil and turps japan (that contains no gum) at the rate of one gallon to every twenty-five gallons of the mixed red lead.

If the red lead can be applied without the addition of japan or other drier, so much the better, that is, if time permits. Pure red lead, mixed with well settled, pure raw linseed oil, that is kept from oxidizing, before application, will adhere in a cement-like way to iron or steel surfaces, because the paint oxidizes where it is put. If the mixture is exposed to the air for any length of time, saponification sets in and ordinary oxide of iron paint would serve the purpose just as well.

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First Coat for Flat Black on Exposed Iron or Grille Work.

For a good first coater on an iron pipe fence, where the finish is to be flat black, we should advise you to prepare your first coat by mixing a good ivory or drop black, ground in japan with enough spirits of turpentine to produce a thin paste, and add to this a good outside or coach varnish until you have a black gloss paint of free flowing consistency. Apply this to the clean iron and permit it to become hard, then apply your flat black, which should be made from a good coach black ground in japan and pure spirits of turpentine and to which one tablespoonful of good rubbing varnish should be added for every pint as additional binder.

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Painting Russia Iron.

The best method of painting Russia iron depends on whether you desire a flat or a gloss finish. Oil paint is apt to crawl or creep on that polished surface and it is best to use pigments ground in japan. For a flat finish, thin the color with turpentine and add a trifle of rubbing varnish, say about one tablespoonful to one pint of the thinned material. This will keep the flat color from cracking and scaling. It is best to first give the iron a wash with benzine to remove any grease, because even the perspiration from hands on such surface is liable to throw off the paint. For a gloss finish you can either varnish the flat coat or coats or you can reduce the color ground in japan with a suitable varnish and put this over the iron direct or over one coat of flat paint, the latter course being best, if not too expensive. When the iron is to be subjected to heat, as in the case of heater pipes, and black is not objectionable, high-grade turpentine asphaltum varnish will serve the purpose, but it is ill-advised economy to use a cheap grade containing coal tar, rosin and benzine, such a nostrum perishing in a short time.

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Repainting Iron Bars That Are Badly Rusted.

Information was asked about the best method to repaint iron bars that are in some parts so badly corroded that the rust comes off in shells so that further rusting will be prevented.

If we were able to give a recipe for the prevention of rust on iron, after rusting has once set in, that is, to arrest rust, we would be doing what no mortal has ever done before or will ever do in the future. We cannot upset the laws of nature, although if the proper precautions were taken in the first place the corrosion of iron and steel could be minimized. The best way to treat the iron bars in question is to give them a thorough scraping with old files, removing all the visible rust, loose or otherwise. Then sandpaper and dust them off, and finally clean them by a wash with benzine. When dry, give them at least one coat of pure red lead, mixed from the dry article with raw oil and turpentine, equal parts, to which a little oil drier is added. If you cannot afford to give two coats give only one. Finish with a good black paint made from pure lampblack, boiled linseed oil and japan, or a good varnish black, but leave asphaltum severely alone, as it will not stand the service spoken of. One coat of red lead and two coats of black should give good service under the conditions named.

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Ornamental Painting of Iron Work.

Specifications issued by an architect called for painting and bronzing inside and outside ornamental iron work and it was desired to know how the work was intended to be done. The outside iron work on balconies and railings, which was to have two coats of paint and to be finished with bronze, wiped in colors, we take to require two coats of oil paint, upon which is to be applied a coat of a durable size or bronzing liquid, on which, while still tacky, vari-colored bronzes are to be applied dry and wiped, which means that the bronze is to be dusted on and then finished off with a linen wad, after which it may be protected by a coat of pale exterior varnish. The colors desired should be specified.

The inside railings were to have two coats of paint and to be finished with aluminum bronze to represent old steel and one coat pale varnish. This, in our opinion, means that any flat drying, steel-colored paint will answer for the two coats, which may be sandpapered and then bronzed by mixing the dry bronze with any bronzing liquid and finally given a coat of pale interior varnish. If the bronze is too light, mix a trifle of fine graphite with it.

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High Gloss Finish for an Engine.

A painter asked us to advise him how to paint an engine from start to finish, the latter to be in a medium shade of chrome green in high gloss. He wanted to know whether the shade of green will be affected by heat.

If the work is entirely new it is best to clean the rough casting with wire brushes to remove all traces of sand, then give a thin coat of mineral paint, not too oily, so as to dry nearly flat. Take iron filler as sold by paint makers for this purpose, and if the casting is rough, thin this filler, which comes in paste form, with a little turpentine and apply it with a spatula of the proper width in a sufficiently thick layer to make a smooth, even surface, wetting the spatula now and then with turps or benzine. As soon as a portion of all the surface has been filled, have some turpentine ready to dip a good stiff brush into, and with this go over the filler in order to smooth the ridges made by the spatula. If the casting is smooth, however, it is not necessary to use the filler as a putty, but it may be thinned with turps and applied with the brush in, say, two coats. No matter how the filler is applied, it must be smooth sandpapered when hard and dry. If the surface is not well filled, another brush coat must be given, and this should be rubbed with pumice and water for a first-class job. Now two coats of medium chrome green in japan, thinned with turps only, are applied, and then one or more coats of finishing varnish. Whether the green shade will suffer from the heat depends on the style of engine. Chrome green will not stand the heat on gasoline engines.

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Steel Colored Paint for Iron Railings.

A cheap way to imitate the color of old steel on iron railings was wanted. If you simply wish to imitate the color of old steel by the application of paint, we would advise you to make a mixture of say one pound of lampblack ground in oil, about two pounds of zinc white in oil, and one-quarter pound burnt umber in oil; heat these up well, adding gradually one pint coach japan, one pint dark hard oil or coach varnish, and one quart turps. This paint will dry with egg-shell gloss in from six to eight hours, and will hold on well to the iron. Should you desire to do the work by "browning" the iron, you will have to proceed as follows:—Dissolve two ounces of crystallized iron chloride, two ounces of antimony chloride and one ounce of gallic acid in four ounces of water, and apply the solution with a sponge to the iron and dry in the air. Repeat this several

times until you have the desired depth of color. Rinse with water, dry again, and then rub over with boiled linseed oil. The metal so treated has a brownish tint and resists dampness.

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Imitation of Bower-Barff Finish.

The usual color of the finish is a pleasant bluish gray or bluish black on unpolished metal, while on polished metal it is a smooth ebony black. On a certain class of work, especially on cast iron, it is a decided brownish black. What you really need is something like a flat enamel of the steel-blue variety or of blue-black color. For the steel blue, take lampblack ground in japan and add to this enough zinc white ground in varnish until you have the desired tint; then thin with turpentine to the consistency of thin varnish. If this dries too flat and lacks binder, add a little good rubbing varnish. To produce the blue-black finish, use ivory drop black ground in japan and add a trifle Chinese or Prussian blue in japan and a little rubbing varnish for binder. Thin with turpentine to proper consistency.

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Green Paint to Imitate Oxidized Copper on Ornamental Iron Work.

Many window gratings, as well as railings, iron gates and other iron work, are painted with a peculiar light green tint that is intended to represent the effect given by copper when long exposed to the air, or, in other words, oxidized copper.

While we cannot give you the exact composition of the material used by the painters who execute this work at the various operations that you may have noticed, we are pretty safe in saying that if you could see all of the work done in different localities side by side, you would be enabled to notice quite a difference as to the tone and depth of the tints. The effect is an imitation of patina, a term given to the incrustation given by age to objects of copper or bronze. While on bronze objects this patina takes on a sort of effect best imitated with raw Turkey umber of a reddish tone, it has a bluish-green tone similar to that given to copper when weak acids come in contact with that metal, commonly called verdigris. We would say that where the cost of the material need not be taken into consideration, a tint made with paris green and white lead will give the cleanest tint that most closely resembles copper patina, while white lead tinted with a blueish tone chrome green of medium shade will give an imitation of good body and permanence. When using paris green for tinting, white lead or zinc white, or both of these, may be used as base, but pigments containing sulphur must be avoided, hence ultramarine blue cannot be added for a more blueish effect. If the paris green does not produce the bluish green tint looked for, then add a little verdigris. When making tints with paris green or verdigris, see that these are ground in oil to the utmost fineness, or streaks in your paint will be the result. In making the tint with chrome green such extra care is not necessary, yet the green should be of standard fineness to produce a good and even tint.

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Rivet Head Composition for Preventing Corrosion.

A good cement or composition for covering the rivet heads used in structural iron work and on the plates of iron and steel vessels was wanted, also for a ship cement, that can be used for filling up the irregularities in the plates.

The best composition for the purpose is a red lead and whiting putty, composed of equal parts by weight of pure dry red lead and genuine English Cliff-

stone paris white (ground chalk), bolted, made in a putty chaser with boiled linseed oil to the consistency of glazier's putty, so that it can be taken into the hand and kneaded without sticking to it. This will require $42\frac{1}{2}$ pounds dry red lead, $42\frac{1}{2}$ pounds paris white and two gallons (15 pounds) boiled linseed oil. It requires two operations. After the mixing is properly done, that is, when the ingredients are so well incorporated with one another that no white streaks are shown, the mass is taken from the putty chaser and spread upon a platform or the floor in a warm room to the thickness of from six to eight inches and allowed to remain there for at least three or four days to undergo what is called the sweating process, and then put back into the chaser and given another thorough mixing and kneading, when it is finished. To use it on rivet heads or butt ends of plates, it is placed on a board with a handle similar to those used by plasterers and worked with a putty or glazing knife to the right consistency by adding turpentine. If quick drying is desired, a small portion of gold size japan or coach painter's japan should be added along with the turpentine. By reducing this putty with coach painter's japan, a little rubbing varnish and turpentine, it can be used also for the filling up of the irregularities referred to. But the usual practice is to use what is known as ship cement, which is made in white, cream, gray or dark red, and consists of white lead and paris white, coach japan and varnish, made in two consistencies, for troweling and for brushing. The first is known as rivet or butt cement, the other as flowing cement. There are no stereotyped formulas for such a cement, each maker having his own, but any one of these that does not contain a goodly portion of white lead is of no value whatever, as the material requires to be very elastic, for the concussions and jars a vessel is subjected to would soon throw off a brittle material and with it the paint on top. The liquid ingredients must be of the very best quality.

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Rust Preventive Paint for Iron Signal Posts in Presence of Salt Water.

A railroad painter in Utah writes:—We are having trouble with our block signals across the Great Salt Lake on our system. They are made of iron, and the posts are painted with white lead and oil and the base with lampblack in oil, but the paint does not stand the salt water. The paint peels and the iron rusts. Would like to hear of some good formula for paint or of a preparation that will stand the conditions referred to. The paint on the buildings in this locality also does not stand well, but blisters badly.

The posts should be scraped down to the bare iron and treated with the sandblast to remove any rust that may have formed, or, in the absence of a sandblast, scrapers and steel wire brushes will serve the purpose. Then the metal should be given a priming coat of red lead, which is best prepared by mixing pure, dry red lead with well settled raw linseed oil, and if required to dry within twenty-four hours, a little linseed oil drier should be added, otherwise the drier may be omitted. This paint should be mixed and applied within twenty-four hours to prevent oxidation in the pot before application. By this method the red lead paint will become hard as cement on the surface and yet remain elastic. For the next coat of white for the posts a combination of two parts pure white lead and one part pure zinc in oil, thinned with equal parts raw linseed oil and turpentine, to which some drying japan is added, is suggested. It would do no harm, but rather improve this first coat of white, if a trifle of lampblack, just enough to take the yellow tinge off the white, were added. As a white finish for the posts we would suggest equal parts by weight of pure white lead and pure zinc oxide in oil, thinned with a mixture of five parts by measure of raw linseed oil, one part white or pale japan and two parts durable body or spar-finishing varnish. For the base, as a first coat over the red lead priming, would suggest pure lampblack in oil, thinned with one-third each of boiled linseed oil, turps and coach japan, so as to dry nearly flat,

yet with good binding properties. For the finish, would recommend pure lamp-black in oil, thinned with two parts kettle-boiled linseed oil, and one part each coach japan and durable body or spar-finishing varnish. That the paints suggested for the coatings over the red lead should be stood aside at least over night to properly amalgamate and be strained before use goes without saying, and that every coat should be brushed out to the full extent and not flowed on is self-evident. No lapses or holidays must be permitted or the moisture will find its way in under the paint and make all other precautions prove futile.

The blistering on the buildings in question is undoubtedly due to moisture, and this can only be prevented by applying the paint during dry weather or when the lumber is dry, and then only when the paint is not too oily on the priming coats and first coats. In salt atmospheres paints containing zinc white or entirely composed of zinc for the finishing coat with a moderate quantity of high-grade spar varnish have proven best, because such coatings will shed moisture and will not permit its absorption or infiltration.

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Best Black Paint for Coating Steam Pipes.

The best method and material for painting the steam heating pipes in a mill that carry about forty pounds of steam pressure was wanted, as it is very difficult to paint them to keep the paint from scaling off. They are to be coated black.

If you give the pipes a thin coat of pure lampblack that has been ground fine in linseed oil, you will experience no trouble about scaling, so long as you brush the paint out evenly. Should this black be too dull, and you can afford to apply a second coat, mix your second coat by thinning a good drop black in japan with a first-class twenty-four-hour coach varnish that is free from rosin, and apply a thin coat of this also, which will give you the desired result.

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Best Paint for Smoke Stacks.

The trouble with smoke stack painting is that in most cases any cheap material is considered good enough. Ordinary coal tar is often employed or some cheap benzine asphaltum varnishes in which rosin and benzine are predominant and coal tar takes the place of asphaltum. It should be considered that a smoke stack is really exposed to very severe conditions, having heat passing through to the elements from without. It has to stand sun heat, warm and cold rains; the metal contracts and expands alternately and it is obvious that only good elastic material can survive for any length of time under these conditions.

The best paint for the purpose therefore is somewhat of the nature of a good black looking varnish made from genuine asphaltum, linseed oil and turpentine, entirely free from rosin, coal tar, benzine, etc. It should consist of 100 pounds of real gum asphaltum, Cuban or Trinidad, that is fused in the kettle with 20 gallons kettle-boiled linseed oil and thinned with from 20 to 25 gallons spirits of turpentine. The price asked by a varnish manufacturer for a varnish of this description may be considered high, but its use will pay in the long run, as the cost of labor in painting a stack is the chief item. This asphaltum varnish will not blister if applied properly, but will bake on the metal as the heat passes through the stack, and it will prove elastic enough to stand all the conditions that it is subjected to. Figure the cost of painting a stack three times with cheap paint and the cost of painting it once only during that time with the higher priced asphaltum varnish and note the difference in favor of the latter method.

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Paint for Iron Pipes in Ice Factory.

The color preferred is red. We would say that ordinary linseed oil paint will not serve the purpose, because of the continuous sweating of the pipes. The best results have been obtained by coating pipes for this purpose with insulating paint, made with the residuum from coal oil stills and bisulphide of carbon, but as this can be had in black only and it being very inflammable and the odor offensive in the extreme, we cannot recommend it for your purpose. Unless you can obtain a red paint that comes to you highly recommended for the purpose, we would suggest that you make a paint from best Venetian red or red oxide ground in oil, thinning it with a mixture of one part coach japan and nine parts of a good grade of coach varnish. This varnish need not be composed of turpentine, but should contain hard gum. Two thin coats of such a composition will produce better results than one heavy coat. By all means, use as good a grade of varnish as you can afford.

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Acid-Proof Paint for Iron Work in Bleach Houses.

What would be a good paint to protect sprinkler pipes, steam pipes, bolts and boltheads, shafting and galvanized iron in a bleach house, where there is little ventilation and where steam vapors and sulphur fumes exist to a great extent? On this job the surfaces referred to had been coated from time to time with various preparations and so-called acid-proof paints, also with asphaltum varnish, but the best of them could not hold on for more than four or five months, then they would come off in large scales, ruining cloth during the bleaching process. Some of the mixtures that have been used, also without success, viz.:—Red lead and boiled oil and red lead and raw linseed oil, without driers in either case; graphite with two-thirds boiled linseed oil and one-third japan; pure white lead, thinned with two-thirds boiled linseed oil and one-third turps and drier; pure white lead, thinned with raw linseed oil and drier. Any kind of paint is put to a severe test in this connection, and more than twenty-four hours cannot be allowed for the paint to dry.

Your problem is a most difficult one, and while we are not acquainted with the nature of the so-called acid-proof paints and cannot therefore criticise their composition, we must say that you could not have selected anything less acid resisting than the red lead and white lead paint you have used. It is a well-established fact that oxide of lead and carbonate of lead are readily attacked by sulphur gases, especially in the presence of moisture, and changed to lead sulphate. This conversion into sulphate of the oxide or carbonate brings about a molecular change, which loosens the hold of the paint film and finally throws it off. It is also well established that linseed oil, especially during the drying process, will absorb moisture, which on evaporation leaves the paint film porous and permits ready access of the moisture and gases to the metal, instead of protecting it. Graphite, when of good quality, is unaffected by these influences, but many graphites, so-called, are but poor pigments, and no better than coal dust. Galvanized iron, too, does not often permit oil paints to adhere, unless first treated with a special priming. When you consider that pigments that are affected by alkaline or acid vapors and vehicles that readily absorb moisture, will not make a good adhesive coating for the work referred to, what then is the logical conclusion? To construct or design a paint the pigment of which is inert to the action of the fumes and the vehicle or medium of which will dry hard and as free of pores as possible. Also that one-coat work is not protective, and that at least two coats are required to give the surface proper covering. Among the inert pigments that are not or are but little affected by the deleterious gases, fumes and vapors, the following may be considered:—Lithopone (sulphide of zinc), white, red oxide of iron, lampblack, mineral brown, raw or burnt umber, and Indian red. By the use of lithopone white, in oil, tinted with

any of the colors mentioned, and thinned with, say, one part boiled linseed oil, two parts turps and one part drier (a good coach japan is best), a paint for first coating will be produced that will dry hard in ten to twelve hours, with eggshell gloss. On this coat a second coat should be applied that differs enough in color from the first to make holidays stand out prominently, so that no spot will be missed. This coat may also be made from lithopone, with any of the colors named, but had probably be best made from one of the colors only, omitting the white. The color selected should be ground fine in paste form in pure linseed oil, broken up with enough turpentine to produce a very stout paint, to which should be added one part best hard gum japan (not ordinary liquid oil drier or brown japan) and two parts of pure hard gum varnish, until the proper consistency for free working is had. This will make an impervious finish, if carefully and uniformly applied, while the first coat will protect the surface of the metal, always provided that it is free from rust and moisture when the painting is begun.

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To Retain Eggshell Gloss on Hot Iron Surface.

How can an eggshell gloss be kept on hot iron (not very hot), by using eight gallons broken japan to thirty-two gallons benzine? Have added some black japan, but this also becomes flat, though not quite as much so as with brown japan alone.

You cannot expect a mixture of brown japan and benzine in the proportions you speak of to retain a gloss on a cold surface, much less on a hot surface. Black japan is made from asphaltum or gilsonite, hence there is a gum present that holds out with better gloss. If black is not objectionable, we would advise you to use asphaltum black varnish in place of the brown japan, otherwise add to your mixture of eight parts brown japan and thirty-two parts benzine about four parts of cheap varnish; furniture varnish would most likely serve your purpose.

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Painting Iron That Has Been First Coated with Coal Tar Preparation.

How should one proceed in painting iron soil pipe that has been coated by the manufacturer with some black tar preparation? When coated with paint of light color, the latter cracks and the black strikes through, turning the paint brown.

Coal-tar coatings or any preparation containing coal tar will strike through oil paints more or less, according to the length of time that has elapsed since the tar was applied. Shellac has been recommended as a priming coat, and in some cases has been successfully used, but this is by no means a certain cure, as the stains will often come through as many as a dozen coats of shellac. Leading sanitary engineers say that they have tried every known means of coating such pipes, and find that the most economical and satisfactory method is to case them in with wood.

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Black Paint for Tin and Iron Roofs and For Boiler Fronts and Smokestacks.

A formula for a good black enamel paint to be used on roofs of wood, tin, iron, roofing paper and roofing felt, etc., was asked for and for an asphaltum paint, as well as graphite paint for boiler fronts, smoke stacks, etc.

Any good lampblack or mineral black ground fine in oil in paste form and thinned with pure kettle-boiled linseed oil will make a durable paint for wood, tin and iron, and will stand equally well over roofing paper and felt. We cannot

give proportions, as that will depend on the grade or kind of black pigment that may be used. A cheaper and more glossy black paint can be prepared by mixing equal parts of liquid coal tar and benzine asphaltum varnish with five pounds powdered litharge and 25 pounds dry air-slaked lime for every 100 gallons of the mixture of coal tar and asphaltum varnish. When all these are well mixed, thin with about 500 gallons of 63-degree benzine for use in cold weather. For hot weather use, the paint should be stouter, and less benzine is used in thinning to effect this. This black paint will serve especially well on roofing and roofing paper.

Asphaltum varnish should be made in iron kettles only, the latter to be on wheels, so as to be readily removable from the fire.

Turpentine asphaltum varnish, usually known as T asphaltum, can be made as follows:—Thirty pounds Syrian or Cuban asphaltum, two gallons boiled linseed oil, eight gallons spirits of turpentine.

This makes a slow drying varnish of good elasticity. Should it be desired to dry hard in about six hours, the quantity of oil must be reduced one-half. The best way to prepare this varnish is to heat the oil first, then introduce the asphaltum, as it will melt more readily and not adhere to the side of the kettle. When the oil and gum are thoroughly fused, the kettle is removed from the fire to a safe distance and the contents diluted with the turpentine gradually, to prevent loss by evaporation. The cheaper grade, benzine asphaltum varnish, known in commerce as B asphaltum, is usually a mixture of asphaltum, ordinary rosin oil and benzine. Many use oil foots or candle tar, the residuum from soap and candle factories in place of oil, but boiled linseed oil is safest. A good formula is as follows:—25 pounds Cuban asphaltum; 25 pounds dark rosin; 1 gallon hard drying boiled linseed oil; 7 gallons deodorized benzine.

The process of making is similar to that given for T asphaltum, but if cost is not an objection, it is best to begin thinning with one gallon of turpentine before adding benzine, to cut down the loss. As for a graphite paint for boiler fronts, smokestacks, etc., it is necessary to select a graphite as free as possible from silica, clay, etc., and grind it in paste form with boiled linseed oil; then it may be thinned to very thin consistency with such a T asphaltum varnish as has been described above, and will give good service on smoke stacks and on boiler fronts, providing the latter do not become red hot or nearly so.

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Primers for Galvanized Iron Surfaces.

Is "flat" paint as good for priming galvanized iron as the galvanized primers, so largely advertised of late?

While a priming for galvanized iron cannot adhere, unless it is a "flat" paint, yet it must have the necessary binding medium to make it adhere well, or the top coats, when shrinking from oxidation, will peel it off in blotches clear to the surface. The safest way to treat galvanized iron successfully is to give it a coating with a solution made as follows:—In one gallon of soft water dissolve two ounces each of copper chloride, copper nitrate and sal ammoniac, then add two ounces of crude hydrochloric acid. This must be done in an earthen or glass vessel, never in tin or other metal receptacle. Apply the solution with a wide, flat brush to the galvanized iron, when it will assume a dark, almost black, color, which on drying becomes a grayish film on which most any paint, especially one of heavy specific gravity, will hold tenaciously. As a gallon of the solution will cover from 25 to 30 squares of galvanized iron, it is a very cheap means to obtain the desired end.

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To Keep Paint from Peeling, When Applied to Galvanized Iron Generators.

For a treatment that will keep paint from peeling or chipping off galvanized iron generators and galvanized iron pipes, apply a solution, which, when per-

mitted to dry, will allow any paint to adhere firmly to the metal under all conditions. This wash consists of a solution of two ounces each copper chloride, copper nitrate and sal ammoniac, dissolved in one gallon of soft water in an earthen, porcelain or glass vessel (tin must be avoided), to which solution is added two ounces of commercial muriatic acid. It is applied to the galvanized parts of the metal only, which become at first black, then dry out with a gray colored film, upon which oil or varnish paints firmly adhere. This method has been in vogue for fifty years, first on sheet zinc and later on galvanized iron, and has proved successful in every instance. The best medium or binder for aluminum bronze to be applied to a heated metal surface is the so-called banana liquid, a mixture of gun cotton, amylacetate and benzol or benzine; of course it must be applied while the metal is either cold or only moderately warm and not near an open flame.

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Statuary Bronze Finish.

The following is the formula for statuary bronze on railroad trimmings. This formula is just general in its purpose, but below I will give an explanation in detail as to its best use on general work, as it has been applied from practical experience:—

Solution No. 1. One-half ounce sulphuret of potassium (known to trade as liver of sulphur) to one gallon of water.

Solution No. 2. About one pint of sulphuric acid to ten gallons of water.

No. 1 solution must be kept hot, and this can be done best by mixing the solution in a crock and setting the crock down into a hot water vat with the top of the crock a few inches above the surface of the water.

No. 2 solution is made cold.

The work should be thoroughly cleaned in a potash solution, then rinsed in cold water and dipped into No. 1 solution, then right into No. 2 solution, and on some of the work, such as yellow brass, this will have to be repeated for a few times to bring out the bronze color.

This work should either be sand blasted or heavily acid dipped or matted on a stiff steel wire wheel brush running at a speed of about 1,000 or 1,200 per minute. After the work is oxidized in the bronze, it should be scratch brushed on a brass wire wheel, scratch brush at about the same speed. This brings out the color uniformly all over the work.

Baskets and other trimmings in castings need only be acid dipped for the statuary bronze, as it already has a dead surface, and a strong acid dip helps to match it.

Smooth work, such as lamp supports, locks, lamp founts, etc., should be cut down smooth by buffing with tripoli, but need not be color buffed. Then the smooth parts are matted or satin finished on a stiff steel wire brush of about from eight to twelve inches in diameter. These wheels are made so that the edges of the wire strike straight on the ends and do not lay over like a fine wire scratch brush.

After the oxidize is on the metal it is run over the brass wire scratch brush, which brings out the color of the oxidize.

Another plan is to copper plate their work first, as this brings all the different metals, such as high yellow brass, old brass and red brass and bronze, to a uniform color to take the oxidize, but in shops where they are not equipped with a plating plant, equally good results can be obtained by a little manipulation.

For yellow brass, after it is either acid dipped or cut down with tripoli, the smooth work should be matted on the wheel or by sand blasting, and is then ready for the oxidize. The yellow brass takes oxidize slower than the metals with more copper in them. The yellow brass should first be dipped in No. 1 solution, then into No. 2 solution, then rinsed in cold and hot waters and dried in sawdust. Then it is scratch brushed on the brass wire brush and then you will have a light shade of brown. On this yellow brass it is best to take it from

the first scratch brush and put it through the entire operation again, the two dips, the sawdust and the dry scratch brushing. This will give a perfect bronze and will match the trimmings in the redder metal. This yellow brass is then ready for the lacquer.

On the bronze, red brass or other metal low in zinc, it is only necessary to put the work through one operation, as the oxidize takes more readily on these and will give the color you want for all railroad work.

With both kinds of metal, when the work comes from the sulphur solution, it must be put through the pickle or No. 2 solution, as this brings out the bronze oxidize.

In mixing the sulphur dip, if you find the half ounce to one gallon of water is not strong enough, you can add more of the sulphur. I have brought it up even as high as two ounces of sulphur to a gallon of water.

George Warlick, at M. C. and L. P. Assn., 1907.

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Vert Antique Green.

Use one and one-quarter pounds sal ammoniac, four and three-quarters pounds sulphate of copper, two and one-quarter pounds rock salt, two-thirds quart vinegar, one-half pint acetic acid, one and one-half pints stale beer, about fifteen gallons water.

This should all be dissolved and well stirred. It is used cold.

The green can be made on copper, brass or bronze, or any of these metals can be copper plated. The work is thoroughly cleaned, same as for plating, then put into this solution for about ten minutes, or until a dark corrosion begins to show on it. Then, as soon as the work is taken from the dip, a stiff bristle brush should be used to stipple it, by softly pounding it until it stops running, as this will avoid runs on the finish.

After this is done, the work is allowed to stand in the air, and the green will come out in about twenty minutes. If the green is too strong, a soft brush can be used and some of it brushed off of the surface, but to be right, the metal should be dark under with the green coming through in a spotted effect.

After this is thoroughly dry, a thin lacquer should be applied, about one part of lacquer to five or six parts of thinner. This will give you the green effect with a slight yellow cast, and these shades on the dark background are considered the correct vert antique.

Another way of making vert finish is to use the liver of sulphur and lay in sawdust saturated with sal ammoniac dissolved in water.

These formulas are like a great many other things—you will have to try them out to get the results, as material will not always work the same.

George Warlick, at M. C. and L. P. Assn., 1907.

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Treating Copper to Produce a Verd-Antique Effect.

No. 1. Dissolve one ounce of sal ammoniac, three ounces of powdered tartar, three ounces of common salt, twelve ounces of boiling water, then add eight ounces of cupric nitrate, and coat the copper with this liquid, first cleaning the surface of the copper free from all oxidation by rubbing it with a weak solution of nitric acid.

No. 2. One-half gallon of strong vinegar, one gallon of mineral green, one gallon of red umber, one gallon of sal ammoniac, one gallon of gum arabic, one gallon of sulphate of iron, four gallons of avignon berries (i.e., fruit of the rhamnus infectorious).

Boil the mixture for an hour, then allow to cool and strain. For use, first clean the copper or brass with weak nitric acid, then rinse off the acid with water, and apply the above fluid with a brush. When the antique green is obtained, apply a coat of spirit varnish before adding the linseed oil coats.

H. C. Standage.

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Greening Copper with Acid.

To produce verdigris (the green incrustation known as patina) on copper, the effect that is sometimes termed verd antique:—

Repeated applications of strong vinegar or acetic acid alone will produce the verdigris incrustation, but will require more time than the following:—Dissolve four ounces distilled verdigris and two ounces sal ammoniac crystals in one quart strong wine vinegar or acetic acid, and wash over the copper repeatedly, allowing each wash to dry before applying another. When the proper effect has been obtained, rinse thoroughly with clear water, allow to dry, then dry brush, and, if so desired, finish with a pale varnish. The above is the method suggested for large surfaces. Small articles are simply immersed in the solution until the desired effect is obtained, then taken out, rinsed in clear water and dried by rubbing over with sawdust, cleaned and varnished.

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Oxidizing Copper.

For a liquid which on being applied to copper turns it green:—

Dissolve four ounces each of nitrate of iron and hyposulphite of soda in one quart of water, and if the articles are small enough, immerse them in this solution, otherwise apply to the surface with a brush repeatedly, until the desired effect is obtained, then rinse with clear water, dry and brush over.

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Putty for Zinc Ornaments.

Take equal parts in bulk of zinc dust, or in lieu thereof zinc oxide and fine paris white, and mix the same to a stout, plastic mass with a solution of 33 degrees Be water glass. Scrape the faulty place first clean with knife or other handy instrument, then fill it with this mass, which becomes hard in six to eight hours, and if the work is to be fine, smooth it with an agate pestle. This putty also adheres to glass, stone and metals, and is water proof.

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Painting of Iron Fences with Asphaltum Varnish

Very much depends upon the quality of asphaltum varnish, and a cheap article is not to be recommended for this purpose at any time. It should be genuine asphaltum, combined with sufficient oil to make it elastic, but it is here, as with many other materials, first cost is considered before quality. Nor would we recommend the application of asphaltum over an oil priming, because the final coat should be the most elastic. Rather than this, the asphaltum varnish should be applied to the metal direct. Our advice is, prime with red lead or a mixture of white lead and red lead, and finish with a good oil paint, to which, if desirable, a portion of first-class outside varnish may be added. The priming should not be too oily to make the finishing coat more adhesive and stand out with a better gloss.

—300—

Mixing Dry Red Lead with Linseed Oil for Painting Iron Structures.

A great deal depends on the purity and fineness of the dry red lead, but we should say that 25 pounds of pure, dry red lead should be thinned with one gallon of pure raw linseed oil, by stirring the oil in gradually, and should the mixture become lumpy it should be strained through a piece of wire cloth or

paint strainer. This will make one and a half gallons of stout paint, which, when brushed well into the iron structure, will not run. If the job is to be hurried, a gill of good oil drier or turpentine japan may be added to the mixture. If the iron be fairly smooth and plenty of elbow grease used, such paint will cover 700 square feet one coat to the gallon.

—301—

Paint for Metal Ceilings.

The first thing to do is to clean the ceilings before repainting with soap-suds to which a little ammonia may be added, scrubbing brush, sponge and elbow grease and a good rinsing with clear water and sponge afterward. If there are no defects in the paint, such as chipping or scaling, any paint, such as is used for inside work, will serve the purpose, and it depends on the use of the room in question whether lead paint or zinc paint should be employed. In a drug store or laboratory, pure zinc white should be used, while for school-rooms, halls, stores or saloons, white lead can be applied with safety. If two coats are to be given and the color of the ceilings is to be in delicate tint or in clear white, the last coat should be zinc white in any case. The mixing of the paint, of course, depends on the finish wanted, flat or glossy, and is the same as for any other ceiling or wall work, that is simply to be recoated.

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Finishing Radiators in White with Gloss.

Use old files and wire brushes to thoroughly remove all the old paint and loose scales, wash down with benzine and allow to dry. Give a priming coat of flake white in japan, thinned with turpentine only, and allow to dry hard. Next give a coat of French zinc in damar varnish, also thinned with turpentine, to which is added a little white enamel varnish, say one tablespoonful of varnish to a pint of the thinned zinc paint to produce a faint eggshell gloss. For the finishing coat use French zinc in damar varnish, thinned to brushing consistency with a good pale baking varnish. If heat can be introduced to bake on every coat, blistering need not be feared, but if heat cannot be had until the job is finished, every coat must be given plenty of time to thoroughly harden before another is applied.

—303—

Painting Machinery to Stand Heat and Ammonia Vapors.

First fill all your machinery parts requiring painting with iron filler or surfacer that you can obtain from any reliable paint manufacturer as per directions on label of package. Then apply one or more coats of the color in japan, that you fancy for the purpose, thinning the paste color with turpentine, to which add some varnish for binder. For finish, use a good, fairly-quick drying baking varnish. Should you desire no particular color, we would advise you to use two coats of good black baking japan over the filler and surfacer.

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Paint for Hot Water Pipes and Steam Radiators.

Most every paint and varnish manufacturer makes a paint suitable for the purpose named, and we would advise you to take advantage of their experience, instead of wasting time and money on experiments. We shall, however, give you all the points we can on the subject. In the first place you must see that the surface is free from scale, rust and grease, and it is best to paint the pipes and radiators while warm, so that the paint may bake on, because when ap-

plied while cold and the paint is allowed to dry and the hot water or steam turned on suddenly, the paint is liable to blister or scale off. Nor must the heat be so great that it will boil the paint during the drying and baking process. Select such colors only as will not be affected by heat to any extent, have them ground fine in japan or varnish, thin with turpentine to the consistency of varnish and add a good baking varnish sufficient to produce a glossy paint of good working consistency. Where white is required, do not use white lead, but zinc white only. For black use ivory black, and for tints use also zinc white as the base. Yellow ocher, sienna raw and burnt, burnt umber, Venetian red, ultramarine blue and zinc yellow are the only pigments that will not change color appreciably when used on heated surfaces. For bronzing, select only the very best and finest grades, because all the ordinary bronzes darken rapidly on heated surfaces. Mix japan gold size and pale baking varnish in equal parts and thin with three times as much turpentine and add sufficient bronze powder to work well and apply. If the luster is not good enough apply a coat of the liquid over the paint, and while still tacky brush on the dry bronze and polish with a woolen cloth. Paint dealers usually carry a stock of radiator and other enamels, bronzes and baking japans or baking varnishes.

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Best Method of Painting or Enameling Zinc Bathtubs.

In order to make your paint hold on the zinc, you need a wash which will produce a film to which oil paint will adhere. First, remove all grease, etc., from the zinc lining with a solution of soda or ammonia, and dry the surface thoroughly. Then apply with a wide, soft brush the following preparation, which any druggist will make for you:—One part by weight of chloride of copper, one part by weight of nitrate of copper, one part by weight of sal ammoniac, dissolved in sixty-four parts by weight of water. When dissolved, add one part muriatic acid. This solution must be kept in glass or earthenware, as it will not keep in tin. This solution will dry in about twelve hours, producing a grayish-black film, on which any kind of paint will hold. However, because of the hot water and soap used in bathtubs, an all-oil paint will not answer well, and only the first coat should contain sufficient oil for binding, while for the finishing coat, especially, a gloss paint, made with good hard varnish, will serve best.

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Painting the Galvanized Lining of a Water Tank to Prevent Corrosion.

If the water contained in tank is to be used for drinking and cooking purposes, paint containing lead or lead salts must be avoided. Ordinary oil or varnish paints will not stick to galvanized iron on metallic zinc surfaces. Clean the tank thoroughly by scrubbing sides and bottom and allow to dry, then make a solution by dissolving 2 ounces each of chloride of copper, nitrate of copper and sal ammoniac in 1 gallon of water, and add to the solution 2 ounces of muriatic acid, and give the galvanized iron surface one full coating of the solution, allowing 24 hours time, when any good paint will adhere to it. Use two coats of zinc white in oil with manganese borate for drier.

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Japanning in Black of Pressed Steel Articles, Applying the Dipping Process.

The main requisite is a drying oven, in which the temperature can be raised to and held at from 300 deg. to 350 deg. Fahrenheit. The size of this oven must be commensurate to the number and size of the articles to be placed

therein at one and the same time. For instance, if it is desired to bake 1,000 pieces of sheet iron or steel plates of about 6 by 8 inches at one baking, an oven 8 feet in length, 5 feet wide and 4 feet in height, with the proper arrangement of iron racks, should fill the bill. Ten rods running lengthwise through the oven, one set near the top and another set one foot below this would be sufficient to hold that number and keep them three-fourths of an inch apart. The oven to be built of either sheet iron or brick, with several vent holes on top and either steam or hot-air pipe coils in bottom to be fed with live steam or hot air.

The next requisite is a dipping vat of suitable size and a run or toboggan arrangement, which has balusters on either side, and whose bottom inclines toward the dipping vat, so as to return the dippings to the vat. On either side outside of the balusters is a pathway for the men, who are doing the dipping to walk up and deposit the dipped plates, or rather the long stick on which the plates are suspended on the balusters. A stick 3 feet long should carry at least 24 of the plates, suspended to the stick by suitable hooks or clasps, and when the plates have dripped or drained sufficiently and the paint or japan has set, they should be placed in the drying or baking oven at once, and when the oven is filled the heat should be turned on immediately and kept on for three or four hours, even six hours would do no harm.

As to the black baking japan for dipping, unless the firm desiring to use such material are equipped to manufacture the material, they had better ask for samples and prices from reputable varnish makers, stating that they want a thoroughly elastic and durable baking japan in black, and select the best of those offered. One that will readily chip or abrade at the least knock the metal receives after baking is not worthy of consideration.

Japanners often give as many as three, four, five and even six coats to their work, baking every single coat before applying the next one. For the work in hand two coats are certainly sufficient, a ground and a finishing coat. It may be that one coat will be ample, but that is a matter to be decided on trial. An essential point is that the metal be entirely clean and free from rust and grease before dipping.

In preparing black (or any other) baking japans, rosin and benzine or gasoline must be avoided if the work is to look well and be durable. For a first coat or ground, the best material is made by melting, say 25 pounds Cuban asphaltum, adding 25 pounds hot balsam of copaiba, stirring well together, taking from the fire to a safe distance and thinning down with spirits of turpentine, previously warmed, to proper consistency for dipping.

For finishing coat, or when one coat is ample, the very best japan is made by melting, say 30 pounds gilsonite and 30 pounds Cuban asphaltum, thinning with 80 gallons of hot linseed oil that has been boiled previously with 12 pounds litharge and 4 pounds manganese oxide, and when nearly cool thinned with turpentine to proper consistency for dipping.

If of too brown a tone, lampblack or drop black ground in turpentine may be added to give a more jet black luster.

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Painting of an Iron Stack with Lampblack and Oil Against Asphaltum.

An iron stack was painted with two coats of asphaltum which perished in less than eight months.

The asphaltum black was probably one of those cheap nostrums composed of part asphaltum and part coal tar or rosin. A true asphaltum varnish with a good portion of oil would no doubt have stood longer. One coat of lampblack and kettle boiled linseed oil will last much longer than two coats of cheap asphaltum, but both lampblack and oil must be first class and the surface must be thoroughly scraped and wirebrushed to remove every trace of asphaltum and rust. We should advise giving the stack two coats of lampblack and oil.

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Painting the Interior of an Iron Roof with Cork Paint.

The specifications called for one coat of paint, then a layer of cork and a final coat of paint.

We have very little experience along this line, and can only make suggestions as they occur to us. The cork must, of necessity, be in a fairly fine powder, the first coat of paint must be stout and oily, so that enough of the cork will adhere to make a uniform coating. We should think it best to coat a small space at a time, spread a cloth under this space to catch the excess of cork when it is thrown on the wet paint, and also to catch the surplus that is brushed off when the paint has dried, so that it will not interfere with the second coat of paint. The surest way to have the work uniform would be to use a good priming coat of red lead, and follow this with a mineral paint, into which the maximum quantity of pulverized cork has been introduced, brushing it on heavy. This would cost considerably less and save a great deal of time and annoyance, and serve the purpose equally as well.

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How to Repaint a Badly Rusted Smoke Stack.

First of all the rust must be removed, which is done best by the use of steel wire brushes of suitable size aided by saturating the incrustations with kerosene oil, which should be washed off with benzine when the rust spots have been removed.

If a good, smooth job is wanted, badly pitted places in the iron surface should be puttied up with a fairly stiff putty made of red lead, whiting and boiled linseed oil. If the stack is not subject to too great a heat and the expense not too much of an object, a coat of red lead in oil, followed by a coat of pure lampblack in boiled oil, will stand best. But if the stack becomes very hot when in use, so that oil paint is liable to blister, we would recommend the use of genuine asphaltum varnish, to which has been added some pure lampblack in oil or some of the very finest dry graphite. If the asphaltum varnish is free from rosin and made elastic by having been melted with the necessary portion of prepared linseed oil and thinned with turpentine, it will bake on the metal and stand very high temperature.

If not desirable on account of the corroded condition of the metal to go to much expense, one or two coats of black paraffine paint or refined liquid coal tar, with or without the addition of fine, dry graphite, will make a fine coating, but this material should not be laid on too heavy or it is very apt to run down the stack in laps. For thinning liquid coal tar or black paraffine paint turpentine may be employed, but light tar oil is cheaper and serves the purpose as well, and the brushes used can be cleaned in this solvent with best result.

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Cause of Paint Peeling from Galvanized Iron and How to Prevent It.

Galvanized iron and sheet zinc require similar preparation in order to make oil paint adhere to the surface. It appears that in contact with air zinc oxide is formed on the surface of the metal, which throws off the paint in shreds or blotches a short time after it has become hard.

We have found that a mixture of equal parts of pure red lead and mineral brown by measure, thinned with equal parts raw linseed oil and turpentine applied as a first coat, has given very durable results in many instances, no matter what the finishing coat was composed of. But the very best results are had if either of the following washes are applied previous to first coating: Diluted muriatic acid is applied to the surface, when muriate of zinc will form. That produces a film upon the metal, which takes a very strong hold on the same, and upon which oil paint will hold as well as upon black iron. Or two

ounces each of chloride of copper, nitrate of copper and salammoniac are dissolved in a glass jar or earthen pot in one gallon of water and two ounces of muriatic acid are added. Either of these solutions is applied to the surface with a wide, soft brush, and when dry it is ready for first coating with any good oil paint.

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How to Prepare Copper on Outside Work.

It is not very clear to us whether you wish to prepare copper to receive paint or to imitate copper with paint on baser metal. If you simply wish to know how to make oil paint adhere to copper or other metal, as, for instance, brass, we can recommend a wash with a solution of sulphate of copper, slightly acidulated with nitric acid, which will roughen the metal so that paint which is not too oily will adhere firmly and will not peel or powder off.

To make a copper paint, precipitate metallic copper out of any solution of a copper salt by introducing scrap iron into the liquid. After drying the precipitate, mix and grind it with linseed oil and japan.

To paint portions of the front of a building in imitation of antique copper or bronze, apply a ground color made from white lead, chrome yellow, burnt umber and Venetian red to resemble dirty copper, and have it nearly flat, then apply copper bronze mixed with good spar or outside varnish and thinned with turps. Then apply a glaze of best verdigris, ground fine in varnish and thinned with turpentine to dry with eggshell gloss, or, if you do not like the greenish effect, use raw umber, ground and thinned in similar manner. Before the glaze has an opportunity to set hard, wipe out the high lights, making a very pretty effect.

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Painting Galvanized Iron Cornices and Spouts.

An Illinois painter gives the following as his method for painting galvanized iron and tin on the side (not the roof) of a building:

The galvanized iron is allowed to stand three months exposed to the weather before painting.

For first coat, Venetian red, mixed with raw linseed oil, driers and enough turps to have it dry with dull gloss.

Second coat: White lead, colors to suit, raw linseed oil, driers and enough turps to also dry with dull gloss.

Third coat: White lead, colors to suit, raw linseed oil and driers but no turps. This is mixed stout and allowed to stand for five days before using. Giving three coats as described makes the job hold for seven or eight years. In repainting he treats such jobs as he would old woodwork, giving two coats of lead paint.

Your method is, without any doubt, an excellent one, and cannot be criticised, unless on the point of expediency. The success of your method does not have its origin altogether in the materials you employ or in the way you mix and apply them, but is to be looked for chiefly in the fact that you do not touch the metal before it has been exposed for three months to the weather. This exposure produces a gray film of oxidized zinc on the surface, upon which your first coat obtains a good hold. In addition to this, your first coat is thinned, so as to dry with an eggshell gloss. If you gave an all oil paint it would not hold on so well in spite of the gray film of oxidation. The succeeding coats or their composition cut no figure in the adhesion, but only give so much more stability and durability to the work. Now while we commend your methods to our readers, whenever they can follow it to the letter, we must also point out to you where they would be obliged to employ other methods. A job of painting new galvanized iron cannot always be permitted to stand for three months, but very often it is required that it be painted as soon as it is put up, as is the case in the building operations.

of large cities or in localities where gases abound that would destroy the metal before it had been put up a few months. For such cases we know of a wash that will artificially produce the film in a few hours, for the production of which nature requires months. This wash consists of a solution of one ounce each of chloride of copper, nitrate of copper and sal ammoniac in one-half gallon of water, made in a glass or earthen vessel, and to which, when perfect, one ounce of crude or commercial hydrochloric acid is added. This is applied with a wide, flat brush, and in a few hours the metal turns black, similar to graphite, and on drying becomes a light gray. After twelve hours the non-adhesive salt is removed with a dry brush.

A first coat made of red lead or a mixture of red lead and red oxide or Venetian red, thinned with raw oil, driers and turpentine to dry with eggshell gloss, will hold for years and may be finished with one or two coats of any desired color or oil paint. We prefer a heavy paint in point of specific gravity for this first coat as against those of great bulk and light weight.

A foreign exchange recommends that metallic gray zinc (not zinc oxide), so-called gris, be employed as the pigment for such a priming coat, and linseed oil and driers for the vehicle.

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Dull and Gloss Finish in White and Paint for Hot Water Radiators.

In either case for flat or gloss finish, bring up the ground work with white lead in oil for first coat, following with a second coat with only one part oil to three parts turpentine, using all, or nearly all, zinc white. For a dull finish you can follow this up with a coat of French zinc, ground in damar varnish, thinned with turpentine only, or in case this should dry too flat, a trifle of damar varnish may be added to the thinned material. If you can afford it, you might give two coats of this in order to make a good and durable job.

For the high gloss finish in the bath room, we would advise that for new work you apply white lead in oil for priming of first coat, follow this with one coat of zinc white in one part oil to three parts turpentine, another coat of French zinc, ground in damar varnish and thinned with turps. This to be finished with one coat of white enamel varnish or white damar varnish to which has been added a sufficiency of French zinc in damar, in order to take away the somewhat yellow cast of the varnish. A trifle of ultramarine blue added to this will also aid in doing away with the otherwise creamy effect. As to painting of the radiators, it is difficult to keep the paint on these from darkening in time from the effect of the heat and lead paint must not be used in any case. For white or tints, use zinc white as the base, using the zinc in oil in paste form, thinning with equal parts turpentine and pale varnish only, omitting oil and Japan driers in thinning.

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How to Prepare Galvanized Iron for Painting.

Dissolve in a glass jar or earthen vessel one ounce each of copper chloride, copper nitrate and sal ammoniac in one-half gallon soft water, and when all the salts are dissolved, add one ounce commercial hydrochloric acid. Apply this wash to the metal with a wide, flat brush, and in a short time the metal will turn black, and on drying over night a whitish gray. Go over this with a dust brush to remove the surplus salt; then go ahead and paint as desired. Paint applied over this will not peel, if of good quality.

—316—

Backing Iron Straps in Cars With Oil Paint Before Priming.

In the overhauling of trolley cars, the carpenters use a white lead paste in oil, thinned with pure linseed oil for backing iron straps. Before the straps are placed in position the wood panels receive a coat of the white lead paint the

width of the straps only, which are then screwed on tight to the body of the car. When this is done, the linseed oil, from the paint back of the straps, spreads on each side of the same one or two inches, the panels not having been primed. A few hours after the straps have been screwed on, the car is being primed. Will not, in your opinion, the oil, which has been squeezed out from behind the straps on each side prevent the priming from drying and cause subsequent coats to crack?

Under nearly any condition the oozing out of the oil is liable to produce trouble, because on each side of each strap for a width of from one to two inches the panels have received a coat of oil, which the balance of the panels did not receive. Hence those strips of panels receive two coats of oil paint or one coat of oil and another of paint, while the oil pressed from under the strap has not had an opportunity to dry. By the time the priming has dried on the panels not saturated with oil, it cannot have dried as hard next to the straps, and the result will be that subsequent coats of paint, especially flat paint, will crack, while all oil coats applied over this portion will peel.

—317—

Mixing Graphite for Painting a Steel Tank.

How should graphite be mixed for coating a steel tank used for storage of water? It was originally painted six years ago with tinted white lead, but not since that time.

We take it for granted that you wish to paint the outside of the tank and not the inside, because if the water is used for drinking purposes white lead tinted would not have been applied in the first place. If your dry graphite is of good fineness you had best mix it with kettle boiled linseed oil, to every gallon of which you should add one-half pint best brown japan and one-half pint of turpentine. First mix the dry graphite with enough of the thinners to make a soft paste, then keep on adding thinners until you obtain a paint of the proper consistency for free flowing under the brush, then put it through a paint strainer to break up any lumps that may have formed. Or purchase your graphite from a reliable manufacturer ground in oil in paste form and use the same thinners we have mentioned above for reducing it to brushing consistency. The size given by you amounts to 6,700 square feet of surface to be painted and one gallon of the liquid paint should cover at least 350 square feet, so that you will require about 20 gallons of paint.

—318—

Painting Fire Hydrants in White.

Information wanted regarding the painting of hydrants or water plugs. These were originally painted black, but had not been repainted since they were put in place some years previous. It was desired to paint them white.

You must not expect to obtain a white job over black paint with one or even two coats of white paint. The plugs should be scratch brushed, i. e., cleaned with wire brushes, the dust removed and then washed down with benzine. An ordinary house paint will not answer for that sort of work, as fire plugs are subject to harder wear. We should say that the first coat should be a light shade of lead color, such as is obtained by mixing one pound of lampblack in oil with 100 pounds white lead in oil. Mix 25 pounds pure white lead in oil and one-quarter pound lampblack in oil, beating the two well together with a stout paddle and gradually add one quart each of pure turpentine and raw linseed oil, beating the mixture until free from lumps, then add one-half pint best brown japan drier and one pint each of turpentine and raw linseed oil. Put all through a paint strainer and, should the paint be still too stout to flow freely from the brush, add more turpentine, but no more oil, as the first coat of paint on iron will adhere better when not too oily. For the second coat we would advise thinning white lead in oil with one part of raw linseed oil and three parts turpentine, so

that the coat of paint will dry nearly flat. A trifle of lampblack added to this will make the final coat stand out whiter. For 25 pounds of white lead in oil (pure), one-quarter of one ounce of lampblack in oil and one-half best brown japan, one and one-half pints raw linseed oil and three quarts of turpentine will be sufficient.

For the finishing coat, a combination of pure white lead and pure zinc white would give the best wear, as well as the best showing white, and we would suggest a mixture of 20 pounds lead and five pounds zinc white in oil, thinned with say one quart turpentine and three quarts best spar varnish of light color.

—319—

Paint for the Inside of Steel Tank Holding Alternately Cold and Boiling Water.

We would not care to suggest any paint for this purpose, unless the paint could be baked on at a temperature of at least 300 deg. F. before being put into use with boiling water therein, and even then would not be able to guarantee success. The paint would have to be a varnish proposition, consisting of the very best asphaltum and hard gum, such as kauri with sufficient varnish oil to add binder to the gums, reduced for spreading with turpentine and baked at the temperature named.

—320—

Best Coating for Radiators or Other Heat Distributors.

Aluminum bronze coatings for heated surfaces have great advantages over all paint coatings and this is proven by the greatly increasing consumption of the material. Its silvery tone is neutral and harmonizes well with wall papers and the interior decorations and furniture of most any room, office or hall. It is also unchangeable when mixed with the proper liquid up to a temperature of nearly 450 deg. F., and therefore unaffected in color by the heat generated in those heat distributors. By mixing with it small portions of artists' tube colors, such as sienna, umber, ultramarine blue, ivory black, any desired change in effect can be produced without affecting its heat conducting properties to any great extent. To prove that aluminum or gold or copper bronze are much better for the purpose than oil or varnish paints it is only necessary to paint a small section of the steam pipe leading to the radiator with as many coats of oil or varnish paint as is required to cover up solid, and along side of this another section with aluminum bronze, and introduce steam. It will be found that in a few minutes the last-named section cannot be touched with the bare hands, while that coated with paint is not nearly as hot. This goes to show that in one case much of the steam heat is wasted, while in the other case the advantage is evident. Of course, the liquid used with the bronze must be as thin flowing as possible and at the same time proof against heat.

—321—

Red Lead Under Varnish on Iron in Damp Places.

How red lead on iron work, that is constantly subject to warm, damp atmosphere, will hold when coated over with exterior varnish after the paint has dried hard.

We do not see why red lead paint should not adhere well to iron under varnish in a damp and warm atmosphere, provided the paint is applied in the proper manner and the varnish fairly damp-proof. Adulterated or saponified red lead paint will not do. Use pure red lead only and pure raw linseed oil, mix these just before you wish to apply the paint and add to a pint of the paint a tablespoonful of coach japan to accelerate hardening and apply fairly stout to

the iron, when it will become as hard as cement and will not crack, scale or peel. If one coat does not make a good uniform job, apply two coats, but let the first coat dry hard before applying the second and mix the red lead fresh for the second coat, same as for the first. Then you may, when this last coat has thoroughly hardened, apply a coat of the best spar varnish over it.

You can, of course, take dry red lead and mix it with varnish, then put it through a paint strainer to free the resulting paint from lumps, but we cannot recommend this mixture for the reason that the oxidizing action of the red lead on the varnish will make the paint so stout in short order that it is difficult to apply, and, at any rate, the paint is apt to scale, and if the dampness is excessive it will not harden, but peel. There are any number of dust preventative paints and damp-proof paints on the market, some of them good, but it is not within the scope of these columns to recommend any of these in particular.

—322—

Tinting Color to Keep Flat White from Turning Yellow.

Is it best to use ultramarine blue or cobalt blue, lampblack or drop black ground in oil with a flat white that has varnish added to it to prolong its whiteness for inside work of iron construction?

Ultramarine blue is the color usually added to white to neutralize the yellow tinge given to it by linseed oil or varnish. For the work you mention, true lampblack would probably be the best, but it must be lampblack made from oil, not a gas carbon black. Imitation of cobalt blue produces more of a greenish tinge with white, while drop black will rather tend to render the white yellow in time than otherwise. If you use ultramarine blue select one of the violet type, rather than the greenish, or if you select lampblack, be sure that you use one that gives the blueish gray tint in white.

—323—

Painting the Logs of Gas Radiators in Imitation of Wood.

These logs are usually bronzed with copper bronze or green bronze, and then blended in with colors, so as to imitate the bark of certain trees. To give certain effects, such as the bark of birch or maple shows, asbestos fiber is attached in certain spots.

The colors used, or rather the pigments employed, must be resistant to heat, as, for instance, umber, raw or burnt, Indian red, mineral brown, oxide of chromium green or copper green. The paint must be made with a medium or binder of silicate of soda, because there is no medium containing oil or gums that will be able to stand such degrees of temperatures as are required here.

—324—

Changing Bright or Polished Brass to a Dull Black.

How is polished brass made black or as near black as possible without painting same? The concern I am with desires to change all steam and air gauges from polished brass with black figures to a dull black with white figures. To paint them black requires too much time and expense.

The articles you refer to cannot be heated or dipped, therefore the solution required must be brushed on, hence the variety of methods to produce the dull black color is very limited in your case. The cheapest and simplest one is to dissolve two ounces of corrosive sublimate (bichloride of mercury) in one pint of strong vinegar. The solution is applied to the brass, which has previously been cleaned, with a soft brush or sponge and permitted to remain until the brass has turned black, when it is wiped off and the brass cleaned and black-leaded. It is scarcely necessary to say that corrosive sublimate is a powerful poison and must be handled accordingly. The surest method, though a little

more expensive, for blackening brass is to use platinum chloride liquefied by exposure to air. This is high priced, but a little of it goes a long way. It is applied with the ball of the thumb or with the finger, and when the black has developed the article is washed with water and allowed to dry. The black will be dull, but if a soft luster is desired it is polished with oil and leather. If it is too much trouble to liquefy the platinum chloride by exposure to air, you can make a solution by mixing one-half fluid ounce of nitric acid and one fluid ounce hydrochloric acid and dissolving therein thirty troy grains platinum. This solution you may apply with a brush, and when the article is blackened uniformly wash off with clear lukewarm water. It is best to use an excess, say forty grains of platinum, in order to completely neutralize the acid solution.

—325—

Flat Black Coating on Aluminum Metal.

By what process can a durable flat black coating be obtained upon articles made from the metal aluminum?

To accomplish this in a commercial way on a large scale the metal is steeped in a solution of three parts, by weight, of oil of vitriol and one part, by weight, of water at a temperature of between 140 to 160 degrees F. and withdrawn as soon as stained, when it is placed in a warm bath consisting of 150 parts, by weight, of chloride of antimony, 100 parts manganese nitrate, 20 parts finest floated graphite, 250 parts hydrochloric acid and 800 parts 90 per cent. alcohol, at a temperature of 90 to 115 degrees F. The article is taken out of this bath at once and while still moist the alcohol is burned off, when a gray coating is the result. It is then at once gone over with a lacquer that is made by dissolving two ounces gum sandarac, four ounces gum shellac and four ounces nigrosine in one quart 95 per cent. alcohol. Denatured alcohol will answer, and the aniline black nigrosine must be soluble in alcohol. The article is then baked at a temperature of 160 to 180 degrees F. for a short time, say thirty minutes to one hour, and on being removed from the oven it is gone over with a piece of cloth moistened with boiled linseed oil, which produces the velvety flat black effect.

For the painter, however, who may have such a job on hand only at great intervals there is another way to produce this effect on aluminum surfaces. It consists of clearing the metal by rubbing it over with pumice and benzine, wiping it clear, and when dry applying a coating of a flat black varnish, which may be made by thinning lampblack or drop black ground in japan with one of the flattening varnishes offered by varnish makers or one of the flat blacks offered by paint manufacturers.

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Verdigris Effect on Copper Balcony, Windows, Etc.

B. S., Detroit, Mich., asks:—Can you inform me if there is any acid stain used to obtain the verdigris effect on copper on the exterior of buildings without painting the copper first, or if there is any other way of treating the copper after it is placed at the building to obtain this effect?

Answer:—If the process of oxidation by nature; that is, producing patina, is to be hastened, a solution of four ounces each of nitrate of iron and four ounces of hyposulphite of soda in one quart of water applied as a wash which is repeated until the desired degree of oxidation is effected. It is then rinsed with clear water, permitted to dry and then dry brushed. To make this antique in effect apply a glaze of raw umber in oil with the necessary drier all over the pressed copper, and when this has begun to set wipe the high lights, thus obtaining the proper shading. The pronounced verdigris effect, however, on copper is produced as follows:—Four ounces of pure French distilled verdigris and two ounces sal ammoniac in crystals are dissolved in one quart of acetic acid (or strong white wine vinegar). With this the copper is washed over, repeating the application as soon as the succeeding coat is dry, until the desired effect is

obtained. Now rinse thoroughly with clear water, allow to dry and then dry brush the surface. A coat of pale spar varnish will produce a very nice finish and keep the effect from becoming too dark.

—327—

Painting Galvanized Iron to Withstand Fruit Acids.

What would you suggest as the best treatment to cover the inside surface of large galvanized iron trays that are used for holding fruit preparatory to canning and in cold water generally? The coating must withstand the attack of fruit acids and give reasonable service for a season of about six months without wearing away. The trays are cleansed at the close of each working day with water and brushes to remove any remaining traces of acid sediment from fruits and juices, etc. Would you use an enamel base and finish, or a paint base and finish, which latter has been tried with white lead base and proved unsatisfactory?

We would not suggest any paint containing white lead for hygienic reasons, as well as for the reason that it is not well adapted for withstanding attacks from any acid. The best we can suggest is a baking enamel proposition, as ordinary air drying enamels will not stand the attacks from the acid as well, nor would it stand the every day cleaning. We would proceed as follows:—If the trays are new and have not been painted or used before that part of the metal that is to be coated should receive a wash made by dissolving in one-half gallon of water of one ounce each of copper chloride, copper nitrate and sal ammoniac, to which is added one ounce of commercial hydrochloric acid. The solution must be made in an earthen or glass vessel. It is applied to the metal with a soft brush and allowed to dry. It will color the metal nearly black, but on drying will become light gray. When dry it is brushed over with a painter's duster and the paint applied thereon will not peel or scale off under any condition. The first coat should be composed of zinc oxide ground in a baking varnish and thinned with part varnish and part turpentine, so as to dry with eggshell finish on baking six hours at a temperature of about 180 degrees F. The second or finishing coat should be composed of best zinc oxide ground in and thinned with hard gum baking varnish and also baked for at least four hours at 160 to 180 degrees F.

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Painting Heated Parts of Machinery in White.

This, in any case, is a most difficult undertaking, and if the temperature of the heated parts exceeds 212 degrees F., it is next to impossible to keep the paint or enamel white, in these places, for any length of time. The vehicle in the iron filler, even if the pigment was white, would, in the first place, be affected by the heat and become dark. White shellac varnish will also gradually darken from the same effect, and so will the vehicle in the white enamel, even if the pigment should not discolor. The only white enamel we know of that has successfully stood a temperature of 270 degrees F., but not over this, was made of the purest French zinc white, ground in a varnish, made by cold process, from the best selected colorless Batavia gum damar and pure spirits of turpentine. The painting of the steam radiator on which it was applied was done as follows:—One coat white filler, made from zinc white and floated silex, ground and mixed in pale rubbing varnish and reduced to stout flowing consistency. The heat was turned on after this had set, and kept on for four hours. After having cooled off, the surface was given a coat of paint, equal parts zinc white and silex, ground in paste form in refined linseed oil, reduced to flowing consistency with equal parts pale baking varnish and turpentine. When set, the heat was turned on for six hours, after which the radiator was permitted to cool gradually. Twenty-four hours later this was repeated with another coat of the same composition, and after another twenty-four hours a third coat, again of the same composition, was applied. This time the heat was permitted to run through the radiator for twelve

hours, and after thirty-six hours the surface, which was slightly yellowish, was lightly gone over with sandpaper. After dusting carefully, the first coat of enamel white, referred to above, was applied, permitted to set for four hours, then the heat was turned on by degrees until it was 212 degrees F., and after being on for two hours at this temperature it was turned on full force for six hours, then gradually shut off. When fairly cooled the finishing coat was given in precisely the same manner, but the heat was permitted to go through the radiator for fully twelve hours. On cooling, the enamel was white, showing no discoloration whatever, and so remained throughout a winter season. This process appears to be rather complicated and expensive, but we do not know of anything more simple that would accomplish similar results, unless the General Bakelite Company, 100 William street, New York city, could help you out with their heat-resisting lacquer.

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Inexpensive Silver Color Paint for Galvanized Iron Tubing.

There is nothing better for this purpose than aluminum bronze powder made into paint by mixing it with a good quick drying thinner. This thinner or binder is best made by reducing a good pale coach varnish with equal parts of petroleum naphtha (benzine) and solvent naphtha or coal-tar benzol. The varnish and the thinning liquids should all be slightly warmed in a hot water bath before mixing. It will require about two pounds of aluminum bronze for one gallon of the liquid to produce a paint that will cover galvanized iron tubes in one application with a soft brush. Owing to the great spreading capacity of this paint it may be considered inexpensive.

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Finishing Shotgun or Rifle Stocks.

Finishing shotgun or rifle stocks so as to prevent them from turning white or otherwise discoloring from moisture:

Whitening of gun stocks by moisture can be prevented by finishing the stocks with high-grade hard gum varnish. The best varnish of this character is made from amber colophony, the fossil grade, fused with linseed oil and thinned with turpentine. The best method is to first stain the raw stocks to the color desired, unless the wood is naturally of that color. If necessary, it should then be filled with paste wood filler, smoothly sandpapered and given at least two coats of high-grade rubbing varnish, each coat rubbed with pumice and oil, these followed with two coats of finishing varnish referred to above, the last coat to be mossed or lightly rubbed, then polished with rotten stone and crude oil. If you are not certain of obtaining the right sort of varnish, and time and labor is no object, the old-fashioned oil polish will give you a finish that will surely prevent whitening or otherwise discoloring from moisture. This is a slow and tedious process, and consists of oiling the wood with boiled linseed oil, rubbing it into the surface with a piece of heavy felt to which some weight is attached, permitting it to stand for some days, then follow at intervals of four or five days with as many coats of oil as may be required, rubbed on in a similar manner until a good, smooth polish is obtained.

—331—

Is It Safe to Paint Tin with White Lead?

We do not think that white lead paint, properly thinned with pure linseed oil, the minimum quantity of good drying japan and turpentine has any deleterious action on tin, in fact we know where tin spouts and other surfaces of tin, painted with pure white lead tinted with small portions of coloring matter, have stood exposure for a number of years, until the corrosion started on the

unpainted inside of the water spouts, and finally came through on the outside in spots. Nevertheless, we would not suggest at the present day painting tin roofs or other exposed tin surfaces with straight lead and linseed oil paint on account of the chalking tendency of this material, which, while it will not affect the metal itself, will permit it to be attacked by atmospheric influences. If the paint must be pure white or of a very light tint; we would suggest a paint composed of 70 per cent. white lead (basic carbonate), 20 per cent. zinc oxide and 10 per cent. inert material (clay or silica), the first coat to be half flat and the finish a full oil paint.

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Painting Brass a Dead Flat Black.

There are several methods by which brass can be blackened permanently to a dead finish, but you would hardly care to dismantle the fixtures of the machine with a view to giving the brass parts a dip in a solution of one kind or another. Brass metal will not permit any other but a dead flat paint to adhere to its surface, and the best way to accomplish the object in view is to clean the brass well first and have it perfectly free of grease.

Triturate dry lampblack with alcohol until it becomes well soaked, and add to this an equal volume by measure of shellac varnish. Beat these well together, then reduce with sufficient alcohol to make it flow quite freely from the brush. A spraying brush is the best means for application, as it avoids brush marks. Denatured alcohol may be used, but it should be of the 188-degree grade.

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Iron Rust Sweating Through Concrete and Three Coats of Paint.

A man painted a suburban residence in white, using a well-known brand of pure lead with linseed oil, giving sills and posts three coats, all other work two coats. The construction of the posts is of decided interest in this case. They were four years old when repainted a year ago, and were painted three coats when erected. They are built of three by fours arranged in a circle, covered with mesh, and then coated with concrete to the thickness of one and one-half inches, and rest on four-foot brick piers brought up from the ground, while the porch floor is of cement. The owner of the residence now complains that the concrete posts sweat out rusty water; that plain water and soap will not remove the stains, but that it is necessary to use a scrubbing brush and very strong soap to clean the posts. He suggests that the pot be given two coat lead and oil, followed by a finishing coat of outside enamel.

The sweating through of rusty water on the posts in question can be due only to the eventual rusting of the wire mesh, which must have been originally coated with paint, or galvanized, to keep so many years from becoming rusty. However that may be, there is no other way to explain it, unless water should get down from leaks in the porch roof in the hollow of the posts. This being hardly probable if all the posts are alike affected, therefore, the moisture must come from the foundation, and, having no other means of egress, must sweat out through the pores of the cement or stucco. We could only reason that during the heated months of the late summer and fall a certain amount of gaseous vapor was generated in the interior of the posts, due to the rusting of the moisture on the three by fours. We do not believe that two coats of lead and oil and one coat of outside enamel will solve the problem, unless the cause of the trouble can be removed.

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Treatment of Copper Before Painting.

Linseed oil or linseed oil paint applied directly to copper or brass, without first preparing the metal, will not stand for any length of time, especially when

exposed to the weather. There are several ways to treat these metals preparatory to painting with oil or varnish paints. One way is to clean the brass or copper with benzol or solvent naphtha, and when dry apply a coat of shellac varnish. Another way, especially when the metal is exposed to the weather, is to make a solution of four ounces of copper sulphate (known as blue stone or blue vitriol) in one-half gallon of lukewarm water in a glass jar or earthen pot, adding one drachm (Troy weight) of commercial nitric acid, applying the solution as a wash, that will roughen the surface, so that paint will adhere tenaciously. But in either case, whether shellac varnish or the solution is used, the first coat of paint must be as flat as possible; at any rate, must not dry with more than a faint eggshell gloss. Over this a good gloss paint will not peel or scale.

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Wearing of Aluminum Paint on Exposed Metal.

An ordinary cheap bronzing liquid, such as is used for interior bronzing, will not wear on exposure to the weather. Aluminum paint made by mixing dry bronze with celluloid varnish and benzine, popularly known as banana oil, stands outside wear to some extent, according to how it is applied, but will not answer well over any kind of paint. It must be applied to clean bare metal. We have seen large gas holders and other storage tanks painted with aluminum, but inside of one year the coating appeared unsightly, and in less than another year repainting was necessary. We understand that in these cases the paint was made from aluminum bronze, hard gum resins, very little oil, and turpentine as the solvent.

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Flatting of Oil Paint on Metal Surface.

Required to know why, when two coats of oil paint of similar composition, in fact, out of the same pot, are applied over a metal surface, previously painted, the first coat should come up with good gloss and the second coat nearly flat.

When two coats of oil paint of similar composition are applied to raw wood, plaster, brick or stone, the porosity of these materials soaks up the oil and the pigments lie on top of the surface with only enough binder to hold them onto the material, but there is little or no gloss. Yet the pores are filled, so that the next coat of paint does not have to give up any of its oil to the ground work, and therefore there is usually a good oil gloss on the finishing coat. Flat paints are of necessity made with a minimum portion of oil, some varnish, japan drier and volatile thinners, and when applied the drying is due to the evaporation of the latter and the pigment is bound down to the surface in a non-porous film. If another coat of the same composition is applied over this, it will naturally not dry out as flat, but will come up with a sheen, if not with eggshell gloss, especially when laid off smoothly with a fine brush.

—337—

Painting a Metal Roof Starting to Rust.

If the roof has been painted before, it is necessary to remove all the old paint as well as the rust by wire brushing the metal, be it tin or iron. When metal has rusted, simply repainting will not stop the progress of rusting, as the corrosion will go on under the new paint unless the rust is first removed as far as possible. After the rust has been well removed by steel wire brushing, use a stiff broom to clean the surface and then give the rusted portion a wash with benzine. When this has dried, give the whole surface a coat of pure red lead, mixed on the spot for immediate use, from say eighty pounds dry red lead (strictly pure), one imperial gallon raw linseed oil, and one imperial gallon of turps. Mix well and

strain, and if too stout to work freely add more oil and turps in equal portions, but no drier. In moderate weather this red lead paint will dry hard inside of thirty-six to forty-eight hours, after which you can finish the roof with any good oil paint made from oxide of iron, red or brown, as you or your customer may select.

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Black Varnish for Stove Pipes, Etc.

Recipe for making a good black gloss paint or varnish for stoves and stove pipes that will not peel, chip or burn off.

These black varnishes are usually made by reducing cheap black benzine asphaltum varnish with the addition of benzine, but, of course, they will perish at the slightest touch after being in use but a short time. One cannot expect to make a black for the purpose that will not burn off or become dead when the heat of the stove or range is nearing red heat. The best that can be done is to make a black varnish or enamel that will be good and durable, because it will bake on the metal when the range or stove is heated slowly and temperature increased gradually. Melt on an open fire in an iron kettle ten pounds of best Trinidad or Cuban asphaltum, and when melted add five pounds boiled linseed oil that has been well warmed. Stir well and heat until thoroughly mixed, then take from the fire to a safe distance and add, while the mass is still warm and liquid, two gallons, imperial measure, of turpentine, or if you find this too high for cost, two gallons of a good turpentine substitute.

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Verd-Antique Finish on Exposed Metal.

The best verd-antique effect on metal work is produced by triturating carbonate of copper that has been well freed of moisture in sandarac varnish. For quick work it may be triturated in an alcoholic solution of gum sandarac and if the metal is bright the varnish should have an addition of one ounce of boracic acid to every 200 ounces of the liquid, but not more, in order to adhere more firmly. However, the usual method is to give the metal a ground coat of flat black in japan and then apply the carbonate of copper and varnish. To give a more pronounced antique effect, put a second coat of the green in the reliefs or high places. It will depend upon the operator's skill and taste if the best effects are to be obtained.

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Blackening or Blueing Brass Permanently.

A good method to color articles of polished brass all over or partly in blue and black.

The first requirement is to have the metal, whether new or old, free from dirt, grease or stains of any kind and that if the brass has been lacquered every trace of lacquer must be removed. To do all of this properly ordinary dust or dirt may be removed by washing with water and brushing over with fine whiting or pumice. Old lacquer, grease, etc., should be removed by boiling the metal in a solution of caustic soda or potash in a cast-iron kettle or pot. Suspend the articles by wire so as to avoid handling as much as possible, and after boiling in the solution, rinse them with clear water and hang them up to dry. If not thoroughly clean it will be necessary to scrub with fine sand or pumice, rinse in water and to suspend them once more in the solution. If previous to coloring the metal is touched with the hand, there are liable to be stains and the coloring is not uniform. Small articles of brass may be cleaned with benzine or gasoline. Where much cleaning of brass is done, as in some railroad car shops, cyanide of

potassium is used in solution at the rate of one pound to the gallon of water. But on account of the extremely poisonous character of the potassium cyanide it is used to a limited extent only. After the cleaning is accomplished the coloring solution for black is as follows:—One part by weight of copper nitrate in six parts by weight of water. Immerse the articles in the solution, let them drain sufficiently and immediately heat them on a hot plate or a clear fire until dry. If the articles are too large to be dipped or if only part of the brass is to be colored, apply the solution with a soft brush and heat the article long enough to convert the greenish salt into the black oxide of copper, but not longer. To color brass articles a deep blue they must be cleaned same as for blacking and suspended by brass wire in a liquid made and treated as follows:—Dissolve in a suitable jar that can be well corked, 100 grammes of copper carbonate in 750 grammes of ammonia, shaking well until solution is complete. Then add 150 c.c. of distilled water and shake again when it is ready for use. To keep for any length of time fill the liquid into glass bottles or jars with ground glass stoppers that should be slightly greased. Keep the liquid in a cool place when not in use. The suspension of brass in the liquid is not to exceed two or three minutes when the articles are removed, rinsed in clear water and dried in sawdust.

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Aluminum Paint for Coating Painted Iron.

Thin two parts by measure of a good pale mixing varnish with one part by measure of ordinary 62-degree benzine and add to this sufficient aluminum bronze powder to cover well. The finer the bronze the less will be required. One and one-half pounds of fine aluminum bronze to one gallon of the liquid should give good results. Do not use the so-called banana liquid, as that is apt to lift the paint.

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Rust Prevention Composition for Steel.

Pure white lead ground in linseed oil mixed with enough refined beef or engine tallow has been used for many years for coating bright surfaces of iron or steel to keep from rusting in transit. Of course, in time, the coating becomes rather hard and requires scraping or an alkaline remover to take it off. A better coating is produced by melting slowly together one pound of ordinary rosin and eight pounds of lard, stirring until cold. If too heavy to be applied evenly with a brush, thin with coal oil or benzine to semi-fluid consistency and brush out thinly. It will preserve the polish and is easily removed with benzine or gasoline. Fine graphite may be mixed with this, if desired, and will give extra protection; or dissolve one ounce of gum camphor in two pounds of lard and take off the scum, then add fine graphite enough to color the mixture and apply to the surface. Remove with benzine when desired.

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Finishing Galvanized Iron Store Front in Imitation of Copper.

Treatment to be given galvanized iron store front before first coating, also what is required to produce the copper effect from start to finish.

We take it for granted that a dull copper finish is wanted, not the green patina, but as near the color of unpolished copper as it can be produced by paint. In order to prevent the paint from peeling, make a wash by dissolving two ounces each of copper chloride, copper nitrate and sal ammoniac in crystals in one gallon soft water, and, when dissolved, add two fluid ounces hydrochloric acid (crude). The solution must be made in a stone or earthen jar or in glass, never in tin or metal of any kind. The solution can be used at once and should

be applied with a soft, flat brush to the galvanized iron, which will first turn almost black, then deep gray, like slate, on drying. When this wash has dried, go over it with a painter's duster or other dry brush, when the surface will be ready for the priming or first coat. This is best made from orange mineral or pure red lead, thinned with pure raw linseed oil with only a trifle of drier for the red lead, but more when using orange mineral. A small portion of lampblack or burnt umber to take away some of the glare of the red may be mixed with the paint. Two coats of this will surely produce an excellent ground for the finish (probably one coat may be sufficient). The copper effect can be made in several ways, the best being made from two parts by weight of medium chrome yellow, one part by weight of Venetian red and one part of ivory or drop black, also by weight, ground in oil, thinned with pure linseed oil and a moderate quantity of good japan drier and turpentine. Owing to the varying strength of some brands of oil colors, accurate figures for the copper color cannot be given, and it is for you to use judgment in the matter.

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Finishing Iron Radiators in Flat Dark Mahogany.

If the bronze is still firm and solid it is not necessary to remove it, but it will be safer to use a stiff brush to remove all dust and dirt and any loose scale before applying any ground coat, which is necessary in any case, whether you intend to grain or paint solid, in order that your flat finish will obtain the proper firmness.

The colors of which mahogany finish is usually composed are seldom heat proof, and in such case, if applied to the aluminum bronze, the heat would soon cause the finish to darken if not blacken it. And at any rate, if the finish is to be in grained effect, you would need the proper ground coat. While a mahogany graining ground for woodwork is usually made by tinting white lead with Venetian red and a little Tuscan red, we should in your case use Venetian red with enough zinc white to produce the proper tint, because white lead does not stand the heat as does zinc white. Burnt sienna and zinc white would also serve as a ground for dark mahogany. For thinning the zinc and the oil colors in this work, would caution against the use of oil, as the heat is apt to cause blisters, but would suggest a good baking varnish reduced with turpentine, so as to dry with fair eggshell gloss. For graining over this, Vandyke brown with enough permanent red lake of the alizarine type, with baking varnish as binder, flattened with turps, should wear and stand the heat best. If painted solid use color ground in japan and thin with turps, adding a trifle of varnish.

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Painting Steam Radiators.

Radiators were painted that had been coated previously with aluminum bronze paint. First flat white and second coat one-third gloss and two-thirds flat white, applied while the radiators were warm. The paint is now peeling off in scales, taking the aluminum paint with it.

The manufacturer of the paint of the material you employed cannot be blamed for the failure of holding on to the radiators, as it is simply due to painting over a surface that was about to peel or scale, at any rate.

These radiators are not free from rust or grease, etc., when installed, and bronzing liquid used with the bronze is not of sufficient binding property to withstand steam heat and is bound to scale off in time. Naturally, when painted over the bronze it was not as firm as a baking enamel would have been, and the flat paint applied was bound to pull off the bronze in time, due to the contraction of the flat paint in drying and under subsequent high temperature. Take all the paint and aluminum off, clean to the metal, with paint and varnish remover, wash clean with benzine or gasoline, let it dry and give it, while cold, at least two coats of baking enamel of the proper shade; let each coat dry hard and warm up gradually.

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Painting Steam Radiators in Gloss White or Ivory.

Statement of facts:—We have just finished a room in a gloss enamel ivory tint. The radiator in this room is composed of two sections of metal (we believe it is sheet iron) suspended from the wall, and this we have trouble with, the enamel having turned as yellow as saffron.

We should like to know if there is a special make of enamel that will stand the temperature of the surface of the radiator when in use for heating purposes. We coated one in another room with flat lead and have had trouble with this also. We should also mention that the radiators in question were finished in maroon color, enameled or varnished before installation about thirty years since, and are still in good condition, the writer having worked on the house when it was erected. The enamel we used lately and had trouble with because of its not standing the heat bears a fancy trade name and is manufactured by a reputable varnish company.

The manufacturers of the goods make no claim in their advertisement as to this particular enamel being heat-resisting, but assert that it will not discolor when used on exterior or high-class interior work, and here is where you erred in applying the material on steam-heated surfaces. You should have procured a baking enamel in white and tinted it with ivory with as little color as possible, and applied at least two coats, running in some steam after applying the first coat, permitting this being baked on. Caution is required to have this hard before applying the next coat, which should be allowed to set somewhat before the steam is turned on. Any reputable varnish maker can furnish such an enamel when specified. Flat lead paint on steam radiators is bound to become yellow rapidly, when the heat is turned on, as white lead is more sensitive than zinc oxide, which is the pigment base in heat-resisting white enamel.

We cannot recommend any special brand of enamel that will not discolor under the conditions you have named, and you must try one that is guaranteed by the maker or seller.

That the maroon paint you speak of has stood for thirty years is natural, because, as you say, the radiators, when installed, had been finished at the factory, the color and varnish most likely having been baked on the metal.

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Coating Galvanized Iron Lamp Shades with Enamel or Gloss Paint.

We have, in these columns, quite frequently referred to the necessity of treating new galvanized iron before painting with a wash of the following formula:—2 ounces copper chloride crystals, 2 ounces copper nitrate crystals and 2 ounces sal ammoniac are placed into a glass jar, holding over one gallon of liquid together with one gallon soft water; the bottle being occasionally shaken until all of the crystals are dissolved. Then 2 ounces of crude or commercial hydrochloric acid is added and the bottle or jar corked up until wanted for use. Stoneware or earthenware containers will serve as well for the purpose, but tin or iron must be avoided, as that would make the solution ineffective and useless.

The galvanized surface is coated by the use of a soft brush, when it will assume a dark gray, almost black color, which on drying becomes a light gray, almost like agateware, which should be gone over with a painter's duster, when it will be ready for the application of the enamel paint. The wash produces a film on the galvanic coating that adheres under any condition, heat, cold or moisture and upon it any good elastic paint will hold, until it perishes through exterior influences. Many are of the opinion that the wash will corrode or destroy the galvanic coating, but it has been proven that such is not the case, as a trial by scraping with a sharp knife will show that the metal has not been attacked.

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Peeling of Paint from Exposed Galvanized Iron Surface.

Wherein is the treatment for galvanized iron surfaces that has been suggested from time to time, before applying paint to new galvanized iron frames and sashes, cornices, spouts, etc., on buildings, superior to a wash of dilute muriatic acid?

Our formula has been tried for over half a century or longer on metallic zinc surfaces and on galvanized sheetings when the latter came on the market. But in going through the streets in large sections of your city thousands of recently built houses on which bay windows, cornices, etc., may be seen where the paint is hanging down in shreds, showing the galvanized metal bare of paint. In some instances this may be due to inferior paint, but in time any oil paint, no matter how good, will peel or scale, unless the galvanized surface has either been exposed for a year or more in order to take on patina, or has been treated to a wash which is best prepared as follows:—Into a large glass or earthen jar place two ounces each of copper chloride, copper nitrate and sal ammoniac and one gallon of soft water. When the crystals are fully dissolved, add two ounces of commercial muriatic acid and bottle for future use, but do not use tin cans or any metal containers. The color of the solution is a bluish-green, and when applied to the galvanized metal or zinc with a soft, wide brush, turns the surface almost black, which on drying assumes the color of dark slate, showing a little dust, which should be brushed off before paint is applied. The solution produces a thin film that is non-porous and so hard that it can be removed only with a sharp scraper, and then it will expose the galvanic coating intact, which proves that, contrary to all arguments, the coating has not been affected by the solution, while if muriatic acid, even when diluted with 95 per cent. of water, is liable to affect the galvanic coating to some extent, unless washed with clear water immediately after application, in which case it may be useless and ineffective. Not so with the copper chloride, copper nitrate and sal ammoniac solution, which requires no washing, but can be painted over immediately after drying. When this solution is placed in tin or iron containers, even for a few hours, the copper salts are deposited on the metal and the solution is useless as a wash for zinc or galvanized iron surfaces. We have seen galvanized iron, so coated and finished with good paint, that have not peeled or scaled in twenty years, even where the paint perished in places.

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Coating Lead Pipes Same Color as Trim of Room.

How to paint lead pipes in a room same color as the trim so that they will not turn to a different color.

Lead or iron pipes in a room that are full of cold water, which is colder than the temperature of the room through which it passes, will condense the moisture in the atmosphere; that is, it will make the pipes sweat, keeping the surface more or less wet, and there is no oil or varnish paint that will hold well on a wet surface and not peel off or change color at least. The best plan is to run the water out of the pipe so as to get it thoroughly dry. Then coat the pipe or pipes first with a good spar varnish, thinned considerably with turpentine, so as to dry almost flat. This is to keep the paint from coming in direct contact with the metal, and when this isolating coat is thoroughly dry and hard apply the paint of same color as used on the trim of the room, but always empty the pipes of water when applying each coat until the same has dried.

INTERIOR PAINTING.

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Interior White Finish, Flat and in Gloss.

A Virginia painter wanted to finish the interior woodwork of a fine dwelling in white enamel, partly dead flat and the doors of light and dark oak and varnished. Would like to know the number of coats and kind of material required for first-class work in white that will not turn yellow.

In estimating on work of this kind, remember that a first-class job on new or old work cannot be done with a few coats. White work must have a good, solid foundation, especially when it is to be in enamel, the finishing coat or coats for which are always more or less semi-transparent. If you wish to secure a good white job that will not turn yellow, you must avoid the use of oil as far as possible, even in the ground coats. For the gloss work, as well as for the flat work, three coats of pure white lead must be given; the first or priming coat to be fairly thin and to consist of lead in oil, thinned equal parts raw oil and turpentine, to which a little pale drier may be added. Before this priming coat is applied, all knots and sappy places are to be shellac varnished and the shellac, when dry, is to be lightly sandpapered. The two succeeding coats of lead should be flake white in japan, thinned with turpentine only, in order to dry flat. When, in this way, the wood has been covered up solidly, the next coat, whether it be for flat white or gloss white, should be made of French zinc white, ground in damar varnish, thinned with turpentine. If not too expensive, a second coat of this should be given, and when dry it is to be smooth sandpapered, avoiding scratches. For high gloss enamel, use French zinc or damar, and thin this with a high grade of white damar varnish to good working consistency, applying two coats, brushing the first coat out well and flowing on the final coat. Each and every coat must be thoroughly hard before the next is applied. For the flat white, thin the zinc in damar to the utmost with pure turpentine and work rapidly, so as to avoid lapses and holidays, or shiners, as the terms may be. This will make seven coats in either case, while in some of the finest jobs, done by first-class decorators in the Eastern cities, as many as ten or even twelve coats are applied for new work on walls and wood. To finish the doors in light and dark oak, if in the natural, all that is required is to fill them with paste wood filler and give one or more coats of interior rubbing varnish, mossaing down the last coat with pumice and water or with steel wool, and give a coat or two of inside finishing varnish. If the doors are of other wood than oak, graining must be resorted to in order to obtain imitations of oak.

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Specification for Flat Painting Inside.

See that all woodwork is smooth and without defects. Prime with a primer, consisting of white lead, two-thirds of turpentine and one-third of raw linseed oil and sufficient drier. Leave stand for a sufficient time for priming to get hard; sandpaper and putty all nail holes and imperfections with white lead putty. After putty has hardened, resandpaper and coat with lead, turpentine and add less raw oil than in the priming coat. For the third coat, if the work is to be white, use three-fourths of white lead and one-fourth of French zinc and turpentine. Instead of oil a white varnish must be used. The fourth coat one-half of white lead and one-half zinc must be used and turpentine and varnish as in the previous coat. The fifth coat must consist of three-fourths of zinc and one-fourth of white lead, including turpentine and varnish. For the sixth coat use pure zinc, turpentine and a little white varnish. Sandpaper smooth between coats.

The following is another method:—

Priming or first coat. Reduce keg lead to working order with raw linseed oil and turpentine; two-thirds oil, one-third turpentine.

Second coat. Sandpaper down with No. 1 sandpaper. Putty up with hard-drying putty. Mixed keg lead with boiled linseed oil and turpentine; half and half.

Third coat. Sandpaper down with No. 2 sandpaper. Mix keg lead with all turps with small proportion of light japan drier.

Fourth coat. Reduce French zinc in oil with turps.

Finishing coat. French zinc in damar varnish reduced with turpentine. If in tints, add necessary coloring matter to all coats.

California Convention, 1908.

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Kind of Sandpaper to Use.

For inside work I shouldn't use anything coarser than No. 1 or No. 0, and I would use No. 00 for finishing. A painter must always sandpaper with the grain, and he must be careful to avoid making scratches that he cannot fill up. There's a flint sandpaper that's almost equal to emery paper, it is so hard. In my judgment, it is more economical and better in every way than the ordinary sandpaper, but people are not willing to pay the little extra cost.

The Veteran Painter.

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Proper Finish for Pulley Stiles of Window Frames.

The pulley stiles of the window frames—in fact, the whole inside surface of the runs—should never be painted. Every time we paint a house, we paint the sash and runs, and of course it is bound to stick. I would give them a coat of stain, to harmonize in color with the inside or the outside of the house, and then I would rub them with a little vaseline, both on the pulley stiles and on the stop beads and parting strips. That would prevent the sash from sticking. If it was done as soon as the sash is painted, it would save a great deal of bother. The trouble is that when the painters go home at night they leave the sash open a couple of inches to dry. Then when the family go to bed, they shut the sash, and it sticks. The next day they don't go round the house and open the sash. If they would raise and lower every sash while the paint was green—in fact every day for a week—there'd be no trouble with sticking sash. And if they would turn the slats in the blinds once or twice a day, for the first few days after they are painted, there would be no trouble with sticking.

Referring to the above a painter in Oklahoma wrote:—"We do not do anything with the runs of windows in the Southwest. Nearly all the inside work here is in natural finish—finished in hard oil. Sometimes, when we stain the wood, we stain the runs with turpentine stain, and we do the same thing if the woodwork is painted. It is very bad policy to either finish the runs with hard oil or to paint them."

In Philadelphia, more than twenty-five years ago, the architects used to specify that the pulley stiles of the windows should be made of yellow pine, and the custom was either to leave them unfinished or just to give them a coat of oil. Any tendency to sticking was obviated by rubbing them with the end of a tallow candle.

The Veteran Painter.

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Stippling.

In painting the term "stippling" means to produce an effect by a succession of small dots, rather than by lines drawn out, as it were, as is the case in the ordinary application of paint, where brush marks are always more or less visible. For stippling, the paint, whether the effect is to be in gloss or flat, must be held stout and is first applied in the regular way, as in ordinary painting. then a

stippling brush, a round, full, bristle brush, similar to a duster, evenly trimmed, is used in a pounding fashion, the same as a pouncing bag upon a pounce in marking a design. This must be done before the paint has had an opportunity to set to any extent, and the movement must be quick, in order to obtain uniform results. In graining in imitation of walnut and mahogany, stippling is sometimes resorted to.

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Painting in Ebony Effects.

A painter having some work on hand of painting in ebony over varnish, over old paint and on new woodwork, wrote asking what treatment and material we would advise.

We should advise to sand down the varnish, as well as the old paint, and in the meantime prime the new wood with drop black in oil or, still better, prime the new wood with a color similar to the old paint. When this is dry give all of the surface a coat of black, so as to have it all look alike, then give the finishing coat in the effect wanted. Ebony, as you know, must be a jet black of the bluish rather than the brown cast, and whether it be done in oil paint or in flat finish a good lustrous oil or japan black should be used with a small portion of Prussian, not Chinese, blue. Should you, however, wish to obtain an ebony stain effect then you will have to remove the old paint and varnish by the use of one of the quick paint and varnish solvents that are now on the market and that do not raise the fiber of the wood. In that case we would suggest the use of an alcoholic stain made from aniline black (nigrosene B) dissolved in alcohol, which can be coated over with shellac varnish and afterwards rubbed to a dull ebony finish.

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Quantity of Turpentine Required to Mix Ivory Black for Flatting.

How much turpentine is required to thin 25 pounds ivory black for flatting and what is the covering capacity of such mixture?

Ivory black or ivory drop black of average quality, ground in japan, will require about 6 ounces of turpentine to the pound, or about $9\frac{1}{2}$ pounds to 25 pounds (about $1\frac{1}{4}$ gallons). This will produce $3\frac{1}{4}$ to $3\frac{1}{2}$ gallons of paint, according to the gravity of the black, and one gallon of this paint will cover over a prepared surface or ground of dark lead color at least 750 square feet, one coat. With some of the more bulky blacks, $1\frac{3}{4}$ gallons of turpentine may be used to thin 25 pounds, which will produce nearly 4 gallons of black paint of similar spreading capacity.

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Priming Sash and Door Frames by Dipping.

A dipping preparation without the use of linseed oil was desired for filling and priming sash and door frames. Must dry quickly.

If you simply desire to fill and prime the sash and door frames without regard to durability, merely to keep the wood from warping, you can make a cheap dipping medium by mixing eight gallons gloss oil or rosin and benzine liquid, one gallon raw linseed oil and one gallon of a pale japan drier. To these ten gallons of liquid add 25 pounds bolted whiting or china clay, mix well and put through a paint strainer. When ready to use for dipping, add two gallons of benzine to the above amount, so that it will drip freely from the lumber and set up quickly. To make the gloss oil or rosin and benzine liquid, melt, say, 400 pounds pale rosin, N, in a kettle, take from fire and thin with 50 gallons deodorized benzine.

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Tacky Church Seats.

A painter grained the seats in a certain church, and wished to have some information to help him out of trouble. The seats are of white pine and hemlock, and he gave them three coats of pure lead and best linseed oil, turpentine and japan, mixing the first coat with turps only, the second and third with very little oil, using turpentine and japan for balance of thinners, and every coat had about five days to dry and harden. He mixed the graining color with oil, turps and the best of japan, and gave it two days to dry; then finished with the best seat varnish he could purchase, but all the seats, excepting six of them, stick when in use.

If the seats were new he started wrongly by using the first coat of lead flat and succeeding coats with oil, no matter how little was used. The first coat should have had oil, the second coat should have been flat and the third coat not more than egg-shell gloss. The graining color should have been ground in japan, thinned down with turpentine and a little varnish added to make the color wipe out fairly well. Even the very hardest varnish is liable to be sticky when applied over graining done in oil on seats and it will remain so for a very long time. To take off the paint to the wood is too expensive, so the only remedy is to go over the seats with a sponge moistened with ammonia; allow it to dry and follow with a coat of good shellac varnish.

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Cause of White Paint on Walls Back of Furniture and Pictures Turning Yellow.

The reason for the darkening of the spaces back of furniture or pictures on white painted walls must be looked for in the absence of light and sufficient ventilation. It requires light to bleach linseed oil, and no matter how little oil is used in interior paint, the part of white paint that is exposed to the light is being bleached, or at least does not tend to darken, while the spaces that are hidden from the light are bound to do so. Especially when lead is present the difference will be more marked than when zinc white alone has been employed, even though lead paint in the interior of dwellings will yellow off even in the presence of light. The only remedy is to use French zinc ground in bleached poppyseed oil thinned with turpentine only for flat work, or French zinc ground in damar varnish and thinned with the same vehicle for gloss work. But even with this precaution the spaces back of furniture and pictures will appear darker unless the position of these articles of household use and ornamentation is frequently changed.

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Reason for Darkening of Paint on Kitchen Walls Back of Pictures.

What is the reason for the interior paint on kitchen walls turning rusty back of pictures?

This may be explained by the fact that all oil paints, be they flat or glossy in finish, require uniform light in order to be even in appearance. Even in rooms of luxury, where there is no smoke, steam vapors or anything of that sort, and the walls are finished in the finest style of decoration, the places on walls where the light has been shut out by furnishings will be found to be much darker or more yellow than the rest of the walls on removing the obstructions. The more oil there is in the paint, and especially when lead or lead driers have been used, the stronger will be this darkening. And on kitchen walls the extreme will be noted, because of the steam vapor and other precipitations lodging back of pictures or other hangings.

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Repainting Old Church Seats in Economical Manner.

You can repaint the old church seats and make a good job of them without resorting to burning off or using a paint remover. First wash the seats thoroughly with soapsuds and ammonia and rinse with clear water, then let them dry. Then take white lead and colors that are ground in japan and mix the paint or tint desired, thinning with turpentine. Wherever bare wood shows, touch up first, and when this is dry give one or two coats of the flat color all over, as you may find necessary to cover uniformly. When the last coat is hard, take fine sandpaper or steel wool and knock off any rough spots, and give, after dusting, a coat of quick-rubbing varnish or chair varnish, but be careful to select a grade that will not sweat out under the warmth of a body. If you can afford to pay the price use a good shellac varnish in place of rubbing or chair varnish.

As to a new front door, it depends on the nature of the wood how it should be finished. If of oak, a paste filler, light for natural or dark for dark or golden oak filler, should be used first. If to be stained the stain is to go on first, then the paste filler. When the filler is dry the surface must be sandpapered and carefully dusted. To make a good, durable job, apply one coat of twenty-four-hour rubbing varnish and moss down. Then apply two coats of first-class outside or spar varnish, allowing three days between coats.

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Method for a Dead Finish in Old Ivory Tint.

First see that the wood is sandpapered perfectly smooth and dust carefully. Prime with pure white lead, thinned with equal parts raw linseed oil and turpentine, adding a little good japan. Apply thin, so as to avoid brush marks, and when dry, sandpaper with No. 0 paper. Putty up with white lead putty, which allow to dry hard. Now apply two thin coats, at least, of pure lead, tinted with a little raw sienna and thinned with turpentine and a trifle japan drier only; use a fine bristle chiseled brush and sandpaper each coat. If this does not give a good surface, apply more of the same lead paint and sandpaper smoothly and dust off carefully. The surface is now ready to receive the finish, which shall consist of at least two coats of zinc, ground in damar varnish, which should be tinted old ivory with raw sienna and some yellow lake, both ground in japan or varnish, thinned with turpentine and a good pale, hard-dry-rubbing varnish. Rub down in the usual way with pumice and water to a dead finish.

Whether you are required to spend more time on the job depends upon your contract, but the foregoing will make good and serviceable work for interiors, though not of the very highest order.

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How to Finish White and Yellow Pine.

The very best, though not the cheapest, way to finish white pine is to see that the work is well sandpapered with the grain, then thoroughly dusted. Give at least one coat white shellac varnish and one coat of inside varnish; if this is too expensive substitute liquid filler for the shellac. For hard or yellow pine finish, apply one coat orange shellac varnish and one or two coats light hard oil finish, or omit the shellac and apply hard varnish instead. A filler is not required for this wood.

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Apparent Causes for Non-Drying of Paint on Interior Work.

The woodwork of the kitchen of a house from which the tenants had removed four or five days previously was painted with white lead in oil, tinted

with burnt sienna and burnt umber, thinned with boiled oil, turps and a small portion of liquid drier. There were no indications of grease on the woodwork. On the base of window sills and the woodwork round the sink and water pipes that run along the ceiling, the paint dried hard, while four days after painting the balance the paint was as wet to the touch as when first applied. On close inspection the color appeared to have separated from the oil and collected in clots underneath. The paint could be wiped off with a cloth, leaving spots of color that appeared quite hard.

Despite your belief that there was no grease on the woodwork in that kitchen, our experience tells us that your trouble was due to one of the following conditions:—The surface may have been greasy without your taking notice of the same, or if not it may have been improperly cleaned by the former tenants—that is soap may have been used in scouring and the soap not properly rinsed off; or your paint may have been fatty and applied too stout. However, if the fault was due to the paint, it would not have dried hard without separation in the places mentioned, and therefore it points to a greasy surface or a surface impregnated with material of caustic properties, both of which will retard the drying of paint. In either case the paint will be apt to run, unless a large percentage of driers is employed; but in the presence of alkali or caustics the paint will separate in the way you describe it.

The painted work of a kitchen, no matter how short a time the room has been used for the purpose, should be thoroughly scrubbed with soap suds or water to which a little ammonia has been added, and then rinsed with clear water very carefully, because the condensation of the steam arising from cooking carries more or less grease with it.

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Color Combinations for the Walls and Ceilings of Hotel Rooms.

The following suggestions are given for rooms intended as bedrooms, therefore you do not want any loud color combinations nor dark somber colors, but rather soft, delicate tints, and would give you the following as a suggestion:—

Wall, subdued orange; ceiling, bluish green; picture molding, silver bronze; woodwork, salmon.

Wall, bluish purple; ceiling, orange tint; picture molding, gold bronze; woodwork, Tuscan red.

Wall, red purple; ceiling, yellow green; picture molding, gold bronze; woodwork, Tuscan red.

Wall, greenish tint; ceiling, light blue tint; picture molding, silver bronze; woodwork, pea green.

Wall, lavender blue; ceiling, silver green; picture molding, gold bronze; woodwork, lavender blue.

Wall, carnation red; ceiling, silver green; picture molding, gold bronze; woodwork, cream.

Wall, old gold; ceiling blue-gray tint; picture molding, silver bronze; woodwork, cream.

Wall, old ivory; ceiling, light sky blue; picture molding, silver bronze; woodwork, ivory tint.

Wall, primrose yellow; ceiling, ultramarine tint; picture molding, silver bronze; woodwork, white.

Wall, warm pinkish gray; ceiling green-gray tint; picture molding, gold bronze; woodwork, white.

Wall, dove gray; ceiling, light gray tint; picture molding, gold bronze; woodwork, light gray.

The combinations named are simply given as an index of what colors would work well together, but you must consider the amount of light that each room would have and arrange the depths of your tints accordingly. The furniture of the rooms should also be considered, and the paint of the woodwork should

be in harmony with that of the walls, unless the woodwork in all of the rooms is to be alike, say cream color, ivory or clear white. Eggshell gloss finish looks better than full gloss; it appears more velvety.

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How to Prepare and Apply a Good Flat Black for Grille Work.

Such a flat black is best made by thinning a good drop black in japan, such as is used by coach painters, with turpentine to a consistency almost as thin as liquid drier and adding enough of a good coach varnish to give the required binder, but not enough to produce even a faint gloss on drying. As such a paint dries very quickly, proper thinning and required quantity of varnish may be readily ascertained by applying a little of the mixture to a piece of hoop iron or black sheet iron, and on drying it can be tested by rubbing over it with the point of the finger.

For inside work, part or all benzine may be substituted for turpentine in thinning the black. A soft, flat brush of suitable size should be used for applying the paint and the brush dipped into the paint lightly only to prevent running over the edges and clogging in the corners. Whether one or two coats should be applied on inside work depends on the nature of the job and the price paid, but real good work cannot be done with one coat.

For handrails and exposed iron work that is to be finished flat, we would recommend a first coat of drop black in oil or varnish that will dry hard with good gloss and finish with a flat black as above, but use no benzine for thinning.

The idea of finishing in flat black is to hide any imperfections or tool marks in the iron that would show up in gloss finish.

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Preventing and Curing Mildew or Mold in Basement Walls.

House mildew, or mold, is the hardest of all fungus growth to prevent or to cure, because it is caused by dampness in the foundation walls and lack of proper ventilation. By placing about a few deep plates or pans of quick lime, renewing the same as often as it becomes slacked, in damp basements, closets or cellars, the appearance of mildew or mold may be prevented and sometimes it may effect a cure, especially when not too deep rooted. In your case the usual remedy, i. e., a wash with muriatic acid would hardly answer, because the surface is painted, nor would melted paraffin, applied hot, do much good, because this remedy is efficacious only when applied to the bare wall and worked in with a paint burner.

Dr. Theo. Koller, in "Die Mapped," says: As to paraffin, there is not a more elastic material which protects more against dampness and atmospheric influence than this product of petroleum. As the cheapest kind of paraffin may be used for the purpose, cost need not be an obstacle in its use. One part of paraffin, melted in three parts of heavy coal tar oil in a water bath, is a superior medium to coat foundation walls or any part of a building exposed to dampness or other atmospheric influences. To have this solution of paraffin and coal tar oil in proper condition for application, put the vessel containing it into a large vessel of hot water, same as you would melted glue, and apply several coats with large wall brushes.

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Unfading Blue, Red and Yellow for Interior Wall Painting.

For wall painting lime proof colors should be selected, and among these may be classed cobalt blue, indigo blue, ultramarine blue and blue smalt; Indian yellow, Naples yellow and permanent or zinc yellow; English vermilion, Madder lake and a comparatively recent product, a very brilliant red, sold under various proprietary names, such as permanent, durable or unfading red.

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Finishing Natural Wood.

1. Stain your natural wood first, if necessary, to obtain desired effect, then fill with paste filler and finish with good furniture varnish or best inside varnish, giving two coats, mossaing the first coat if fine work is wanted.

2. Stain your mahogany with a thin oil stain, made from a mixture of burnt and raw sienna, to which a trifle rose pink may be added, fill with mahogany paste filler, give a good, full coat of rubbing varnish, rub or moss down and apply two coats of outside finishing varnish. If the wood is rich enough, staining may be omitted.

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Cheap Sizes for Walls to Be Kalsomined or Painted.

It is always best to first go over whitewashed walls with strong vinegar and then give one or preferably two coats of the following size:—Soak one pound of good white glue over night in soft water, pour off the cold water and dissolve the glue in hot water in the usual way. Slice one pound rosin soap fine and dissolve in water by heat. Dissolve two pounds alum in hot water. Then stir the dissolved glue and soap together, and when well mixed, put in the alum solution. Now thin the mixture with warm water, until it is of proper consistency for the brush. This size works well over old whitewash or over old kalsomine, and if two coats are applied will keep water stains from showing.

The size, however, should be applied as warm as possible, and if possible, the room should be fairly warm also. A cheap size for new walls to be painted is made as follows:—Take five ounces of sal soda, one ounce powdered borax and twenty ounces powdered rosin; stir these into one and one-quarter gallons of boiling water and keep stirring until dissolved. In another vessel have five ounces good white glue dissolved in one gallon of water, to which add one gill (one-quarter pint) of the first solution, and boil both solutions separately for about ten minutes; then mix the two, strain, and the size is ready for use. It is best to apply this warm and still better if applied over a priming coat of white lead, instead of applying it to the plaster direct, but may be used either way.

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Thinners for Wall Painting in Oil.

The kind of thinners and in what proportions used by leading decorators in the painting of large wall spaces in churches, public halls, etc., so that no laps will show. White lead tinted to be the pigment and the paint to dry either flat or in eggshell gloss.

To prevent laps in the finishing coats of wall painting in flat or eggshell gloss finish it is necessary in the first place to have the ground glossy and uniform without streaks or brush marks. When lead in oil, tinted or otherwise, is to be the basis of the paint, and the finish is to be dead flat the lead in oil should be ground very stiff, otherwise the oil will have to be drawn to some extent; in other words, the lead in oil will have to be mixed with turpentine and allowed to stand over night, when next morning the thinners, consisting of oil and turps, are poured off to be used in other work, as in oil finish, etc. Then the remainder, which still contains enough oil to bind, is thinned with turpentine and very little drier, and this will make a dead flat finish. Two gallons of turpentine to every 100 pounds of white lead is sufficient as a rule to make the paint flow out evenly. For eggshell gloss finish it is not necessary to draw the oil from medium soft white lead to thin it, one-third linseed oil and two-thirds turps with a little japan drier will be the proper proportion. We would suggest for 100 pounds white lead in oil, from three quarts to one gallon of linseed oil and one and one-half gallons to two gallons of turps with one pint of drier, according to the portion of tinting colors added, as the proper proportions.

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To Prevent the Discoloration of Interior White Finish.

The very best thing to do is to purchase from a reputable paint manufacturer pure French zinc, ground in paste form in the best white damar varnish, thin it with pure spirits of turpentine to the right flowing consistency and apply it over the finish that has yellowed off. As an act of extra precaution we suggest a mossing down of the surface with No. 0 steel wool or sandpaper before applying the new finish, also the addition of a small portion of ultramarine blue to throw the white off the creamy tinge. Before applying the new coating test it out on a similar ground, and should it be too flat for egg shell finish add a trifle of white damar varnish or enough to give you the luster desired.

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Fire Resisting Paints for Interior Woodwork.

Experience has shown that paints consisting mainly of linseed oil, driers and pigment are not fire resisting, let alone fireproof. However, repeated coatings of water glass (silicate of soda) will serve the purpose. Apply to the wood three coats of silicate of soda 3 deg. Be., and before the last coat has set hard, apply a thin lime wash, which unites with the silicate of soda, forming silicate of lime, which is an insoluble substance.

Another fire resisting water paint is made as follows:—Eighty pounds powdered silex, forty pounds bolted china clay and twenty pounds air-slacked lime are mixed intimately with sixty pounds liquid silicate of soda, 33 deg. Be., and then thinned to painting consistency. It may be colored with any earth color, such as ocher, umber, sienna or red oxide, but not with chemical colors. Two coats are necessary. If the paint is to be pure white, add, in place of any color, sufficient dry zinc white, using additional silicate of soda in the first mixing.

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To Prevent Church Seats Becoming Tacky.

If the seats are finished in the natural remove all grease by washing them with soapsuds, to which a little ammonia has been added. Sponge off with clean water and dry with chamois leather. When, dry, rub over the seats with fine sandpaper, then dust and revarnish with a seat varnish that is guaranteed by the manufacturer, or with a hard-drying rubbing varnish that you know will not sweat out on becoming warm from the heat of a body. Do not look at first cost in a varnish for church seats, otherwise it will be dear in the end. If the seats were painted and varnished before, sandpaper the old varnish as much as is needed to remove that part which is perished, then touch up worn spots with paint made by thinning color ground in japan, thinned with turpentine and, this having dried, go over the whole seat with similar color and, this having dried, apply seat varnish or rubbing varnish. In varnishing church seats it is most important that while there should be good ventilation, there must be no draught of air and the church should not have a temperature lower than 75 degrees Fahrenheit.

It would probably be cheapest in the long run to give the seats themselves two coats of good grain alcohol shellac varnish, but we do not recommend wood spirit shellac, nor white shellac. The orange shellac, dissolved in denatured grain alcohol, will serve the purpose and will not cost more than a fair grade of rubbing or seat varnish and tackiness need not be anticipated. Going over tacky church seats with a first-class orange shellac varnish, after sponging them with a borax and water solution, will generally effect a cure.

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Painting Woodwork in Imitation of Mahogany.

Light mahogany finish over white woodwork.

The best course to pursue is to first clean down the woodwork and then sand-paper it to remove gloss, if there is any. Then prepare a ground color, using one-third by weight of white lead in oil, one-third by weight of Venetian red in oil, the remaining third equal parts yellow ochre in oil and chrome yellow orange in oil, thinning this with one part japan and three parts turpentine to the right brushing consistency. This will make the right ground coat for light mahogany and dry with an eggshell gloss. One coat of this should be sufficient to cover the white, but it may be possible that two coats are required to make a smooth job. That depends upon the present condition of the surface. The best effect in mahogany imitation is obtained by graining over this ground with oil color in the usual manner, using a light burnt sienna in oil to which some whiting is added to make it comb out well. Japan drier and turpentine are used for thinning. If you understand graining, you will, of course, know what tools to use and how the work is done. If not, you will have to try another way to obtain the result, as you cannot produce the right effect with a solid paint. Instead of graining, go over the same ground with light mahogany oil stain, made from burnt sienna and a little raw sienna, ground in oil, thinned with drier and turpentine. With a little practice you can comb the stain to imitate mahogany.

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Cause of Pompeiian Red Striking Through White Paint.

Two rooms and a hall, which had previously been painted Pompeiian red, received two coats of white in eggshell finish, with pure lead, linseed oil, turpentine and drier, allowing sufficient time between coats for drying hard. In about two weeks' time one of the rooms began to show pink streaks and in a short while had all turned pink, save a few streaks; the hall acted similarly with the exception of one door cap. Another coat of white did not stop the turning. The other room, a bathroom, remains perfectly white.

The reason for the striking through of the old red paint must be looked for in the probable composition of the pigment of the same. Pompeiian red is, or rather should be, an oxide of iron pigment, but in this case, as in many others, a red pigment toned up with a dye of the type of para red was most likely used, which invariably will strike through any white or other delicate tints, more so, when they are made for flat, eggshell or semi-gloss effects. Another feature is that such a red, no matter how long the coating may have stood, will act in that way, more especially when such coat has also been flatted. The only preventative is a heavy coat of varnish into which the dye may bleed and which then holds back any further bleeding. If you had been aware of this and had given a coat of shellac varnish or suction varnish over the red, before applying the white, the trouble should have been avoided. The turpentine in the white paint has aided in the bleeding and it will be a waste of time and material to place any more coats of white on top of the stained portion. We should suggest a thin coat of white shellac varnish or other pale varnish, which will stop further bleeding or staining before applying more white paint. That the bleeding did not occur in the bathroom is probably due to the red having had a full gloss finish, as bathrooms are usually finished that way.

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Holding Back the Bleeding of Stain Through White.

In finishing a stairway the risers and spindles of which are done in white enamel and the treads and handrail stained mahogany with oil stain, the workmen got some of the stain on the wood to be done in white, and after the painting

the stain has bled through the enamel and is still doing so. How can this be remedied and further bleeding stopped?

The bleeding of the stain through the white enamel is due, no doubt, to the presence of a bleeding red dye in the stain, most likely a red of the para group, and the bleeding could have been prevented only by coating the stained portions over with shellac varnish. To remedy the evil and stop further bleeding of the stain we can only suggest that the enamel be sandpapered to remove the gloss and all of the surface coated with white shellac varnish, which, when dry, should be mossed down and the white enamel finish placed over this.

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Best Interior White for Rubbed Surface.

The best way to bring up a good white job in interior work, if it is entirely new, is to give it a good non-shrinkable foundation by priming with pure lead in oil that is thinned with two parts oil and one part turps and a little white drier, to be followed with another coat of lead in oil, thinned with one part oil and two parts turps. Third coat lead in oil and thinned with turps and a little white drier only. When this coat is dry and hard it should be sandpapered, in order to efface all brush marks. If cost is of no object, the next coat should be made from flake white ground in varnish and thinned with turps. As a finishing coat over this we would suggest French zinc white, ground in white damar varnish and thinned down with a good, hard white rubbing varnish and enough turps to make it flow out and level down in good style. If the undercoats have not given a level surface it may be necessary to apply two or three coats before rubbing. The number of coats to be applied depends very much on conditions of surface and the price obtained for the work, but the essential point is always to build up a good foundation. If the work is on an old surface previously painted, a less number of lead coats is required, but the old surface must be free from cracks, firm and well sandpapered.

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Refinishing the Woodwork in Parlor Now Stained Mahogany.

A subscriber says he has the woodwork in a parlor to do over. Casings and doors are pine lumber now stained mahogany. There is also to be a new colonnade to be put in. How could he stain this an even dark mahogany, or would we advise him to finish all the woodwork in white enamel?

You can renovate the mahogany stains on the old woodwork by cleaning down the surface and giving a fresh coating of varnish and stain the new colonnade by matching the stain of the old work, but if you want to finish all the woodwork in enamel white it means quite a job, as you have to build up a good solid ground for the enamel finish. If the old mahogany stain was a pigment and not an aniline stain, it is comparatively easy, but in the latter case it is liable to bleed through successive coats of white, which of necessity must be flat, and the turpentine in such a paint is liable to raise the color in the stain, no matter how old it may be. Renovating the old stain with varnish coats and staining the new addition to match the old work would be lower in cost, but usually it is not the painter's choice that counts, but that of the owner. If you wish to enamel the woodwork you have to sandpaper down the old finish, anyway, and you can readily determine whether the stain will bleed.

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Preventing Window Sash from Sticking After Painting.

The pulley stiles, or runs, should never be painted but just coated with a stain to closely match the outside color of sash or be left the same as the inside of frame work. If this be done and a little vaseline put on the pulley stiles, the

stop beads and the parting strips, there will be no sticking. Of course, if the tenants would raise the sash and lower it frequently while the paint has not yet hardened, although apparently dry, for a week or so, there would be no sticking. But as a matter of precaution, it is best for the painter to use the vaseline. Thirty or forty years ago the custom was to rub the pulley stiles with a tallow candle.

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Tinting Inside White Paint on Old Ivory.

The use of yellow ocher with white will produce cream white or a buff tint, according to the quantity of color added. For a delicate ivory white a very little raw Italian sienna of yellowish tone will be best, although French yellow lake will produce a much cleaner effect. For Colonial white a trifle of lemon chrome yellow or zinc yellow would probably be the best tinting color, but in no case should a white that has been blued be used. Lithopone paint belongs to this class, as lithopone whites are always more or less tinted with ultramarine blue when manufactured.

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Varnish Cracking After Being Coated Over with Flat White Paint.

A painter had painted some highly varnished trim three coats of flat paint for which he used pure white lead in oil, turpentine and a small portion of enamel to bind it. Later he noticed a lot of fine hair cracks apparently through the varnish clean down to the wood.

It is just possible that the highly varnished surface was so slightly fissured with hair cracks that they were not noticed, and if such was the case it is but natural that the drying of the flat paint made matters worse. But even if the varnished surface was perfectly firm and solid throughout it was wrong practice to apply the flat paint directly over it without first removing the high polish of the varnish by sandpapering or pumicing. However, if the cracks extend clean down to the wood it looks very much as if the cracks were present in the varnished surface, although not apparent to the naked eye, unless closely inspected. In that case the sandpapering or rubbing down of the gloss would not have prevented the cracking of the flat paint, and the only preventive would have been the removal of the varnish. Three coats of flat paint of exactly the same composition of vehicle and binder, such as was used in your work, is not proper, and the surface is also liable to give trouble sooner or later, even on a rational foundation.

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Painting the Walls of a Cold Storage Room.

The following conditions were stated:—Have been a reader of your magazine for many years and appreciate your offer to answer questions. Am foreman painter in an institution, where a room has just been finished for the purpose of cold storage, as follows:—A half-inch plaster of Portland cement was placed over the brick walls on the outside, followed by a layer of one-inch cork blocks directly on the cement. Then the same kind of cork was dipped into a liquid that looks and smells like gas tar and applied to the first layer of cork. Finally, a plaster of Portland cement, to the thickness of one-half inch was applied over all. You will see that there is no air space between the cement or cork. The temperature of this room is to be kept just above the freezing point, or about 36 to 40 degrees F. The room is to be painted in white, and in my opinion if water color is used it will turn yellow and will not stand. And by using a white enamel the sweating of walls and ceiling will cause the paint to peel. Is there any white paint that promises to give satisfactory results on a job of that kind?

It will be a difficult matter to find a white paint of any kind that will not turn yellow in time in a room such as described, because a white enamel could

not be baked on walls or ceiling, the only method by which yellowing off would be avoided, and where peeling would not be apt to take place from the sweating. There are many refrigerators for household use on the market in which the interior metal lining is coated with white enamel paint, but this is baked on at a certain temperature. Still, unless you are expecting too much, you can make a pretty good job by giving the interior walls and ceiling of the room a priming coat of white, that is, not too oily, followed by at least one, if not two, coats of a good flat white, and finish with a hard-drying white enamel.

The principal thing, however, is to have the room well aired or ventilated, and that every coat is permitted to dry hard before another is applied, and that none of the coats of paint are applied in too stout a consistency.

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Stippling Interior Woodwork and Plastered Walls.

Methods employed in stippling interior woodwork and plastered walls in flat and gloss finish:—

The term "stippling" in painting indicates a more or less rough but uniform effect rather than a perfectly smooth surface. It can be done in both flat or gloss finish, although the gloss finish will not be as high as it would be in the ordinary way of painting without stippling. In preparing the surface for this on unpainted woodwork or walls of plaster, at least two coats of lead and oil should be applied, with enough drier and turpentine in the second coat to make it dry half flat, whether the finish is to be flat or in gloss. The paint for the stipple must be held rather stout in either case and contain enough drier to make it set within a few hours and must not show a tendency to run. The paint is applied in the ordinary way with round, full, bristle brushes to the woodwork and with four-inch flat brushes to walls. While two men apply the paint on large jobs, one man uses a large stippling brush, oblong in shape, on the paint, when nearly set, in the same fashion as a pouncing bag is used in marking the letters on smalted sign.

The idea of stippling is to obtain a more uniform surface that will not show brush marks. The stippling will show up to best advantage when the work is done quickly.

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Mixing Glazing Liquid for Eggshell Gloss.

What is best way to mix glazing liquid to obtain an eggshell gloss?

That depends entirely upon the use you intend it for, whether inside or outside work. If for interior work, select a good pale hard oil finish; for outside exposure a good outside hard gum varnish. In either case, warm your varnish and your turpentine, mixing three quarts varnish with one quart pure turpentine.

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Making Starch Solution Adhere to Glossy Paint.

To a gallon of starch solution add one sheet of isinglass (gelatine) dissolved in a half pint of hot water and one tablespoonful of refined glycerine. If you cannot obtain the isinglass, use instead a half-pint best golden syrup.

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Matching Interior Finish to Old Surface on Oak.

Matching part of old woodwork finished in the natural, the new work being oak lumber and the finish to be dark oak effect, similar to the old work.

By no means use paste filler or shellac varnish before staining, because in that case the stain cannot penetrate. Use a penetrating oil stain, that will match the old work fairly close, which you can ascertain by staining a piece of the new wood; and, unless it is of very open grain, apply a coat of orange shellac varnish over the stain; otherwise, take paste filler colored with a small portion of the stain. When the filler has dried hard, smooth sandpaper the surface, then give two coats of good inside varnish, or, for a hurry job, one coat of orange shellac and one coat of inside varnish. But for good work we would suggest one coat of inside rubbing varnish, which can be mossed and then a coat of flowing varnish. In order to make a first class job, the old work should be lightly sanded or mossed down and varnished same as the new work.

STAINS AND STAINING

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Preparing Wood for Staining.

In preparing the wood for staining and preparatory to putting on the aniline water stain, we have found it practicable and desirable to rub the wood over with a combination of five parts of benzine and one part of oil, for the purpose of preventing absorption of the greater portion of the stain in the softer and unfinished part of the wood, and to the end that we may get uniformity of color and better results. In addition, it prevents raising the grain.

J. G. McCarthy at International Assn. M. H. P. & D., 1908.

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Staining Oak by the Fuming Process.

The specifications for a job require that all the oak woodwork be fumed.

Fuming oak produces the peculiar olive brown tone of old oak, but some species of red oak do not take the treatment well. The process is a simple one. The wood to be so stained is placed in a room of appropriate size, whose windows and doors are tightly closed, but which has a pane of glass so fitted that the operation may be watched from the outside. On the floor of the room are placed shallow dishes with liquid ammonia of good strength, as upon that depends the rapidity of the work. In a room of 14 by 18, one gallon of ammonia of about 26 degrees Be., and twelve hours' exposure is required.

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The Process and Object of Fuming Wood.

Fuming of wood has an advantage over all other methods of darkening its natural color, because it does not raise the fiber, and leaves the wood in its original condition. It is the best method where a wax finish is desired, because in many instances, where stains are applied, the wax gives a mottled appearance, while with fumed wood a uniform effect is assured. As a rule, oak is the only wood that is fumed, but the process may be resorted to in some few other kinds of wood. The process is simple and is carried out in this manner:—For small objects use an airtight box, for larger ones an airtight room, into which place, on the bottom or floor, a number of flat porcelain or glass dishes, filled with 26 degrees ammonia. Place the objects to be fumed on brackets above these dishes, close the box or room as tight as possible and allow the wood to remain over night or longer, until the desired effect is obtained. Then remove the objects and give them a good airing in order to permit the ammonia vapors to evaporate before finishing the wood with wax or filler and varnish. Weathered oak or Flemish oak effects are best, when so produced, the staining being even and uniform, and sandpapering may be dispensed with.

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Staining Oak by Fuming with Ammonia.

The questioner wanted to know how to finish oak by fuming. The suggestion of using liquid ammonia had been tried, but the shade desired by the

architect was not obtained, whose sample is much darker than he is able to obtain by fuming for thirty hours.

Probably your ammonia was not of the proper strength or perhaps your wood did not contain a large enough percentage of tannic acid. A certain species of American red oak does not take kindly to staining by fuming. Ammonia of 26 degrees Be. is required to give the desired effect, according to time of exposure. This fuming method is intended to impart to oak the peculiar olive brownish effect of old oak, and it has the advantage of not raising the grain, penetrating deeply like a veneer, and the coloring is even and clear, not destroying the grain of the wood. In staining oak by fuming care must be taken that the surface to be stained is free from glue or grease, as such portions are unaffected by the fuming and would show up in white spots. For staining furniture by this process a room can be made in a corner of the shop, say eight feet long by four feet wide and six feet high, the joints closed by pasting paper over them, with a pane of glass in one side for observation, and a door on one end, which can also be made tight after the articles and the saucers with the ammonia are placed in position. The articles to be fumed must not touch sides of the room so as to hinder the free circulation of the fumes, and three or four saucers holding one pint of ammonia among them should be placed on the floor of the room, which will be sufficient for this size. For the woodwork of a room a comparatively larger quantity of ammonia is required, but it must be remembered that the household ammonia sold for family use is entirely too weak; it must be of full strength. If this method is too troublesome and does not give the desired effect, try the following:—Boil two ounces of catechu in three pints of water, let it cool and strain. Apply this solution to the wood, and when dry, brush over with a solution of bichromate of potash, two ounces of the crystals to three pints of water. The best finish for these stains is eggshell gloss, produced by flat or matt varnish or a wax polish.

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Fumed Oak Effects.

Instead of subjecting the oak to the fumes given off from strong liquid ammonia, the fluid can be applied to the wood, by means of a mop at the end of a stick, when the darkening of the oak will occur at a quicker rate, and appear just as effective. Another solution that will produce a suitable "fumed" effect, of a rich brownish tone, is composed by dissolving one ounce of bichromate of potash in hot water, and when cold, diluting the solution with sufficient cold water to produce a fluid of the staining strength desired.

Yet another liquid is one in which iron filings are dissolved in sulphuric acid and this fluid diluted more or less with water, and applied several times until the desired coloration is effected, allowing each application to dry before applying the next. The fluid will produce a somewhat silver-grain color on oak, etc., and all woods containing much tannic acid.

To give new oak the dark brown appearance of age, make a thick solution of caustic lime and water, and lay this over the wood. After it has been worked into the wood with a brush, and allowed to dry on the wood, then brush off with a hard brush.

A rich brown coloration on oak is obtained by dissolving one ounce of catechu (gambier) in 30 fluid ounces of water, and applying this to the oak with a sponge or brush. When the wood is dry, brush over it a solution of bichromate of potash, made by dissolving one ounce of the bichromate in 30 ounces of water. By dissolving two ounces of pearl ash and two ounces of American potash in one quart of water, and applying this, it will darken the color of the new oak.

H. C. Standage.

—393—

Fumed Oak Effects.

How can one get fumed oak effects where it is impossible to use the ammonia process, as the work is too large? The questioner tried several ways of mixing a stain, but cannot get it dark enough.

Fumed oak effects cannot be obtained by any other than the ammonia process. The nearest approach that may be had is by staining the wood with an ivory drop black in japan that is thinned with spirits of turpentine. The black should be free from addition of blue, so as to give a slight brownish effect. When the stain has been applied, and before setting hard, it should be wiped with a cloth.

—394—

Imitation of Fumed Oak Stain and Antwerp Oak Water Stain.

We were asked for a formula for an imitation of fumed oak in stain, and for an Antwerp oak water stain.

The effect of treatment by ammoniacal vapors on oak can be produced by a solution of one ounce catechu in $1\frac{1}{2}$ pints of boiling water. When the catechu is dissolved in the boiling water strain the liquid and apply hot to the wood. When dry, brush over with a solution of bichromate of potash 1 ounce to $1\frac{1}{2}$ pints of water. If this is too much trouble, give several brushes of the bichromate of potash solution. As we understand Antwerp oak stain, the flakes must show a brown coffee color, while the grain is black. This stain can be best produced by dissolving aniline black (nigrosene) that is soluble in water, adding a very little Bismarck brown.

—395—

Weathered Oak and Flemish Oak Stain.

The necessary material for the ground and for making the stain for weathered and Flemish oak was asked for. What color ground is needed for graining in weathered and Flemish oak effects and what colors for graining?

We have never heard of graining in imitation of weathered oak, but in Flemish oak the ground may be made of either drop black or lamp black in japan, bodied up with a little white lead, but the latter must not be in excess, so that a sort of dark slate color is produced. The graining color is drop black in oil with plenty of drier and is glazed over on drying with a glaze made of Vandyke brown. Weathered oak, no doubt, can be imitated in graining by applying a ground made of white lead and raw umber, a very dark drab, the color for graining consisting of a mixture of raw umber and drop black in oil with a good deal of drier. A glaze is not required.

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Treating Oak to Produce Weathered Oak Effect.

This can be brought about by treatment with alkaline solution or by staining with either water stain, spirit stain or oil stain. Weathered oak is a term employed to designate the natural appearance given to dressed oak by age and exposure to the elements. The depth of the effect depends upon the length of time of exposure and the location. It may be simply a light brown or a

brownish black effect or any intermediate hue between these. There is no set rule or standard. The following solutions will stain red or white oak to the weathered effect, and penetrate well into the wood. These must be applied repeatedly until the proper depth is obtained:—

1. Equal parts of sulphate of iron (green copperas) and water.
2. Iron filings or the scales from a blacksmith's forge, steeped in sulphuric acid and water. Apply the liquid from this with a sponge tied to a stick until the wood is dark enough.
3. Dissolve one ounce bichromate of potash in one pint of water. Use this alternately with No. 2, always permitting each coat to dry.
4. Dissolve two ounces each of American potash and American pearl ash in one quart of water and apply to the wood with a sponge on a stick, but take care that your hands do not come in contact with it. Give alternately one coat of this and one coat of No. 1 or No. 2.

All of these solutions tend to raise the grain of the wood somewhat, and if it is to be finished, the surface must be smooth sandpapered. A quick drying weathered oak stain can be prepared by saturating with alcohol equal parts of Vandyke brown and ivory black in fine powder, mixing this with shellac varnish to a thin paste, and then thinning with wood alcohol to thin consistency for brushing. Or the aniline black nigrosene B with a trifle of Bismarck brown may be dissolved in alcohol and used with shellac varnish and alcohol as above, or diluted with water and used as water stain.

The spirit stain, however, is best for fine work, as it does not raise the grain, and the shellac acts as binder, giving a nearly dead finish without a second operation. An oil stain can be made by using Vandyke brown and ivory black in oil, using turpentine or benzine as thinners and a good brown japan as drier.

In staining red oak, the stain must be more of the blue black character than for white oak.

—397—

Translucent Fancy Stain for White Oak.

Two pieces of wood were received showing rich brown and rich green stain that the painter was unable to match exactly, and asked for advice. They were to be matched on white oak.

In order to obtain a similar effect to that shown by the samples, the stains must be made of strong colors with rich tone. The white oak must be stained first and then filled with paste filler, that is stained with color similar to those of which the stains are composed.

The green stain is best made from Prussian or Chinese blue that is devoid of bronze cast, to which good pure drop black is added, and this mixture is diluted with enough Dutch pink to give the bluish green effect which is shown by the sample.

Use colors in oil to make the stain, and thin them with good japan and pure turpentine. For the brown stain, which resembles rich dark mahogany, we should suggest burnt Turkey umber, toned with red lake and a little drop black, these colors to be in oil and thinned as above. Allowing the stains to be set for the proper length of time and then wiping with a cloth will bring out the proper lights.

—398—

Finishing in Cathedral and Mission Oak.

Cathedral oak is best produced on white oak, is dead flat and nearly like ebony. It is to imitate the finish produced by time in many of the cathedrals in Europe. Water stain is used and a black paste wood filler, then a thin coat of

white shellac is given, which is sandpapered lightly and finished with French wax furniture polish.

—399—

Origin of Flemish Oak Finish.

This finish can be seen in many of the interiors of the churches, castles and ancient houses of Continental Europe, most notably in the Netherlands, Belgium and the northern part of Germany. That it is called Flemish is no doubt due to the fact that the style originated with the Flemish architects and builders of the fourteenth century.

—400—

How the Flakes Are Brought Out in Finishing Quartered Oak.

The use of shellac varnish is of service only when the effect of quartered oak finish is imitated on straight sawed oak, when the flakes are penciled in on the filled work with white shellac varnish, but should be omitted in finishing quartered oak.

In this finish, natural or golden, antique or otherwise, the flakes should be carefully wiped, as soon as stained or filled, before stain or filler has time to set. Staining the wood before it is filled and wiping out the flakes clean with a small piece of sponge will bring the latter out prominently on the finish and, as a matter of course, the filler must be wiped off also, so that the only coloring of the flakes is from the varnish.

—401—

Oak, Walnut and Mahogany Stains.

Can a wood dye be made by adding dyes to turpentine, oil and drier? What dye should I use for dark oak, walnut and mahogany?

There are some coal tar derivatives on the market, known to the trade as fat aniline colors, which are soluble in oil, turpentine, benzol or benzine, and in varnish. Each manufacturer, however, has his own designation for these, and in order to obtain the proper material the consumer must specify what the colors are intended for and then must make the combination most suitable. These colors are in powdered form and can be obtained in yellow, brown, orange, light red, deep red, green, blue and black. They are termed fat or oil yellow, fat or oil brown, etc., and you had best write to your nearest supply house for them.

The colors you require are the fastest of that class, as you require only brown, orange and red. But if you find this too troublesome, why not buy the stains ready made or make them yourself with the use of oil colors, using a combination of sienna and umber for dark oak, burnt umber and Vandyke brown for walnut and burnt sienna and rose pink for mahogany. By breaking up the paste oil color with a small portion of brown japan, then adding a little boiled linseed oil and reducing this to thin consistency with turpentine, you will have the most permanent and durable stain it is possible to make.

—402—

Renovating Mahogany Stained Furniture.

Some furniture that was stained mahogany some fifteen years before had turned a very dull brown. How may a mahogany stain be made that will retain

its original brightness; also how may the furniture referred to be restored to its original brilliancy?

You will scarcely ever find a stain that will hold its brightness or rich tone for fifteen years. Even if the pigment used in the stain, which most likely was burnt sienna, enriched with a permanent lake, will hold its color, the vehicle employed in the stain is bound to darken with age. We would advise you to rub down the surface with pumice and water, and when dry, give a glaze of permanent red lake, similar to madder in rubbing varnish, and when dry and hard, moss with curled hair and flour of pumice, then give one or two coats of high-grade cabinet varnish, polishing with rotten stone and sweet oil. For a permanent mahogany stain would suggest best grade burnt Italian sienna in oil, enriched with a permanent red or brown madder lake in oil, thinned with spirits of turpentine only. The aniline mahogany stains will not hold their color as long.

—403—

Staining and Finishing Birch in Imitation of Mahogany.

The proper method of staining and finishing birch doors in imitation of mahogany was wanted.

The best way to proceed is to stain the doors first and wipe off the surplus in such a manner as to bring out the beauty of the grain, which is rather close. When the stain is dry it should be sandpapered lightly and two coats of shellac varnish applied, on which a fine polish can be produced, but as shellac varnish is high in price it is probably more economical to apply over the stain a coat of mahogany paste filler, very much thinned, sandpapering when dry, and then apply a cabinet rubbing varnish, which may be mossed down with steel wool or pumice and water, when the finishing varnish is applied. This may be left in high gloss or polished with rotten stone and oil. A good mahogany stain can be obtained from any reliable paint house. Ask for oil pigment stain.

—404—

Creosote Stains of Good Durability.

A good, lasting and drying creosote stain in two colors, dark brown and green, was wanted.

When you speak of creosote stain we take it for granted that you wish to use it for shingles and to apply it by dipping as well as with the brush.

For drying stain with good drying properties we would recommend for the liquid portion a mixture of two gallons raw linseed oil, two gallons turpentine; two gallons coal tar creosote oil and one gallon brown japan. With this quantity, thin down fifty pounds Indian red and five pounds lampblack to produce ten gallons dark brown stain. The colors should be ground in oil without adulteration of any kind to avoid sediment. For a green stain thin down with the above quantity of thinners, twenty pounds chemically pure chrome green in oil, of any shade desired, producing about eight gallons of strong stain. If a deeper color is desired, add enough lampblack in oil to obtain proper depth. Stains of this strength will answer as a brush coat over shingles that have been dipped before being laid or to stain over old shingles painted before. For dipping purposes a few gallons of benzine may be added to the quantities given. Crude carboic acid may be used in place of the creosote oil.

A cheaper kind of creosote shingle stain may be prepared by using similar quantities of the colors in oil named above, thinning them with a mixture of two gallons of high test, water white petroleum oil, two gallons of crude carboic acid or creosote oil, one gallon each of linseed oil, brown japan and benzine.

This will not dry as well, but will not wash off, as the linseed oil and the petroleum oil act as binders, and if the colors referred to are used, there need be no apprehension that rapid fading or darkening of the stains will take place.

—405—

Is Creosote Necessary in Shingle Stains?

Shingle stains can be made without creosote in any form, but if made from oil color and thinned with linseed oil, drier and turpentine or benzine it is liable to turn black on long exposure. Cresote is used to preserve the wood from dry rot and mildew or fungus growth. Dead oil of tar or carbolic acid may also be employed, the principal purpose of these ingredients being to penetrate deeply into the wood. The colors selected should be such that they keep well suspended while the shingles are being dipped and fairly permanent and non-fading. Petroleum products may also be used in connection with creosote, but the stain should have sufficient binder to keep from washing off.

—406—

Shingle Dip or Shingle Stain.

A formula for a good dip for shingles, and a preparation for cedar shingles was asked for.

If you wish a plain shingle dip without color, use creosote oil alone, or equal parts creosote oil and kerosene oil, which preparation is cheap and will do for any wood, including cedar. If you wish a shingle dip with fireproofing qualities, place the following chemicals in a fifty-gallon barrel:—Twenty pounds zinc sulphate, twenty pounds alum, eight pounds caustic potash, eight pounds manganic oxide, all powdered, and eight pounds oil of vitriol 66 degrees Be., and fill the barrel with boiling hot water. In another barrel or trough have a lot of shingles loosely packed; fill this with the hot solution, and let the shingles soak for four or five hours, keeping them under the liquid. The first barrel, in which the solution is made, can also be filled with as many shingles as the liquid will cover. Repeat this operation until all the shingles you need have been treated in this manner. When the shingles have dried and the roof has been laid, it may be coated with linseed oil paint of any chosen color. While this treatment does not render the shingles absolutely fireproof, it makes them fire resistant to a great degree. One or two dips in hot linseed oil will best serve for the weatherproofing of cedar shingles.

—407—

Moss Green Creosote Shingle Stain.

You can make a moss green shingle stain with cresote oil as part of the thinner by first preparing a moss green oil paint from chrome green, raw umber, white zinc and a little lampblack in the shade that will suit you best. For a gallon of stain, take one quart of oil and add, while stirring, one quart of benzine and two quarts of coal tar creosote. This will cost you in the neighborhood of fifty cents per gallon, exclusive of labor. You must remember that you cannot buy the material as low as the manufacturer, and it would pay you to purchase the stain ready made.

—408—

Repainting Shingle Roofs with Stains.

Two coats of green stain were to be applied to shingle roof on which they had come off in some places, inferior oil having apparently been used originally. What is the course to pursue to give the new stain a good hold?

If the old stain is brushed off thoroughly with steel wire brushes, every part that is not solid will come off, and there will be no risk in applying the new stain. Probably the old stain is so chalky that a good, stiff fiber broom, such as used in stables, will remove all that is required to permit the new material to obtain a good hold. The chief requirements are to get rid of all the loose material and give the first coat of new stain proper binding to obtain a good hold.

—409—

Varnish Stains and Colored Varnishes.

A recipe was wanted for making cheap varnish stains that can be used on new as well as painted surfaces, something like the article that is sold at about one dollar a gallon in retail stores.

He also asked for a recipe for making a good grade of colored varnish, to be used for natural wood that has been marred or misused.

There are various ways for making varnish stains. The base or coloring matter may be aniline colors that are soluble in oil, or staple pigments that are ground in oil or in japan, or in a mixture of these, or directly in the varnish which they are thinned with to the proper consistency for painting. If the colors to be used are ground in oil, a quick drying varnish is required for thinning the base and the addition of some japan. When using as the base colors that are ground in japan, additional driers are not required, but a slower drying varnish is needed to give elasticity. When the colors are ground in varnish a small portion of turpentine should be used to break them up and the varnish added afterwards. For a varnish stain such as you speak of, a moderate priced benzine furniture varnish is all you can afford to use. With oil colors, 10 per cent. of what is known as a six-hour varnish will be required. With colors ground in japan a twelve-hour varnish would serve the purpose. When the colors are ground in varnish the thinning varnish should be one that dries on interior surfaces in from eight to ten hours, dust free. As a painter and grainer you will know what colors are required for each particular stain, and you will also know that the combined color and varnish must be stained before it is put up in cans for use. By experimenting you can find out the strength of your colors and thereby ascertain the quantities required for each stain. There is one point in the preparation of varnish stains that must not be lost sight of; the color should be translucent as possible, so that the natural grain of the wood is not obscured when used on an unpainted surface.

For a good grade of colored varnish to hide scars, etc., on natural wood, the varnish must, of necessity, be of a much higher grade than that used in ordinary varnish stain, and if such colored varnish is to be used on hardwood floors or baseboards, a high grade floor varnish should be selected, while the coloring pigment had best be ground fine in a good rubbing varnish, though colors ground in japan may be used with a slow drying varnish. Always beat up your color well in a small portion of the thinning varnish and gradually add the balance.

—410—

Water Stain and the Raising of the Grain.

The owner of a house insists on having water stain used on all of the wood-work, which is North Carolina pine. How long can the raising of the grain be prevented?

Add to each gallon of stain one-half pint aqua ammonia and from one-half pint to one pint pure spirits of turpentine, warming all on a water bath to make it mix well.

Alum can be used, either by sponging or brushing the surface with a solution of about one pound to the gallon of water, before or after staining, to prevent raising the grain of the wood, or the powdered alum can be mixed with the stain, provided the stain does not contain ingredients which will not mix with the stain. This is one of the best methods, although it will not entirely prevent the trouble.

The addition of castor oil or glycerin to the stain, which is often resorted to, is not recommended, as they may be non-drying.

Nothing is so far known which will entirely overcome the difficulty.

A thin coat of shellac applied over water stain will sand down the grain better than varnish.

John Dewar, of Pittsburgh, goes over the entire surface to be stained with clear water applied with a wall brush, and allows it to dry over night. The next day the surface is sandpapered to remove the raised portions of the grain. When this is completed water or acid stain may be applied without danger of further raising the grain.

—411—

Formulas for Water Stains.

The consumer can prepare his water stains, as he requires them, by the following formulas:—

Mahogany Water Stain—One ounce Bismarck brown or dry mahogany stain. One ounce ammonia of 18 degrees. One quart water.

Dark Oak Water Stain—Two ounces permanganate of potash dissolved in one quart of water.

Light Oak Water Stain—Dissolve in one gallon boiling water, sixteen ounces soluble Vandyke brown, and add twelve ounces picric acid and four ounces ammonia of 18 degrees.

Walnut Water Stain—Dissolve in one gallon boiling water twenty-four ounces soluble Vandyke brown and add two ounces ammonia of 18 degrees.

Satinwood Water Stain—Add to one gallon of lukewarm water two pounds picric acid and six ounces ammonia of 18 degrees.

Rosewood Water Stain—Dissolve in one gallon boiling water twelve ounces soluble Vandyke brown and two ounces Bismarck brown, and add three ounces ammonia of 18 degrees.

Ebony Water Stain—Dissolve in one gallon boiling water six ounces nigrosene B (soluble) and ten ounces soluble Vandyke brown and add three ounces ammonia of 18 degrees.

Cherry Water Stain—Dissolve in one gallon lukewarm water four ounces Bismarck brown G and add eight ounces picric acid and three ounces ammonia of 18 degrees.

These stains will keep well in sealed packages or stoppered bottles and because of being mordanted with ammonia, will penetrate well into the wood. Not only does it depend upon the stain itself, but also on the wood, as to what effect will be had. For instance, a piece of Southern pine will not take a water stain as would the soft white pine, nor would maple take the stain as well as would white oak.

—412—

Water Stains from Dyewoods.

Logwood extract or decoction is largely used for staining wood to imitate ebony, black oak, etc., and mixtures of decoctions of logwood and other dyewoods are made to produce stains of various colors not only for wood, but for leather, horn and other articles.

For an all-around cheap black stain, one pound logwood chips, one-half pound black copperas, one-half pound extract of logwood, one-half pound of indigo blue and two ounces lampblack are boiled in an iron pot over a slow fire for at least one hour. Then allow the decoction to cool, strain through cloth and add one-quarter ounce nutgalls and it is ready for use. Small articles may be steeped in the liquor, while the latter should be applied with a sponge to large objects.

Campeachy wood produces a black stain, if used as follows:—Eight pounds campeachy wood chips and one pound sulphate of copper (blue vitriol) are boiled in eight gallons of water; when cold, the liquor is strained through a cloth; the objects are immersed in the solution for twenty-four hours and then dried in the air.

Brazil wood and logwood make a beautiful deep red stain by boiling one-half pound of each in four pounds (half gallon) milk of lime. This stain, when cooled, is filtered through cloth. Articles of ivory, horn or ordinary bone are first boiled for one hour in a solution of four ounces alum to one-half gallon of water and then immediately placed in the stain, allowing them to remain therein until they acquire the desired color. For wood, this stain is applied with a sponge.

Fustic decoction will serve as a brown stain when the wood has first been mordanted with bichromate of potash. Logwood decoction under the same process will give a darker and more reddish brown effect.

Alkanet root steeped in alcohol with dragon's blood and aloes will make a good spirit stain of a cherry or crimson color for wood or leather; one ounce alkanet root, powdered, two ounces each of aloes and dragon's blood, powdered, one quart 95 per cent. alcohol. When strongly enough colored, strain the stain through cloth.

Annatto, one-half pound, boiled in six quarts of rain water in a copper kettle until the annatto is dissolved and to which a lump of potash, the size of two walnuts, is added, then kept on fire for one-half hour longer, makes a good cherry water stain.

Turmeric, powdered, two ounces; dragon's blood, powdered, two ounces; digested in one pound of 95 per cent. alcohol, will make a good mahogany color for leather when heated and applied warm.

Catechu, four ounces, boiled in six pints of water, makes a good brown oak stain, if, when dry after staining, the surface is brushed over with a solution of two ounces bichromate of potash in three pints of water.

Camwood, two ounces, digested in one gallon of 95 per cent. alcohol in a warm place for twenty-four hours, to which is then added three ounces extract of logwood and one ounce aquafortis, and when dissolved the spirit stain is ready for imitating rosewood.

Orchil paste, one pound, is boiled for thirty minutes in seven pints of water, which will produce a gray stain on wood, if treated with the solution and before it becomes quite dry, it is brushed over with iron nitrate of 1 degree Be. Excess of iron gives the gray a yellow tinge, otherwise it will be bluish gray.

• —413—

Water Stain for Staining Birch in Imitation of Mahogany.

The most economical and effective stain for this purpose is made by dissolving one ounce of the aniline dye, known as Bismarck brown, in one-half gallon

of boiling water. When cold it is ready for use. Try it on a small piece of the wood and if too strong add more water; if too weak, make a stronger stain by using more of the Bismarck brown.

—414—

Cherry Wood Stain.

A painter had some very old cherry woodwork to match and finds that oil stains require so much color as to make them more like paint, thus hiding the grain of the wood.

If you wish to stain in oil, we would advise you to thin a rich burnt sienna of good transparency, that is ground in oil, with turpentine or benzine only, adding strong japan so as to make it dry within reasonable time. When set, wipe off the superfluous pigment and the grain will stand out nicely. You probably use impure color of weak staining power and too much oil. If you can employ a water stain, take the aniline color known as Bismarck brown, dissolve one-half ounce in one-half gallon of water by boiling, and give as many applications as will give the desired effect.

—415—

Rich Effect in Mahogany Finish with Dark Spots Here and There.

The new fixtures of a bank, all mahogany, were to be finished in a rich deep effect all over with darker spots here and there. The painter wished to know how this can be done in the most approved manner. Also whether there is anything better than nitric acid or bichromate of potash for darkening the spots desired.

The simplest and safest way to darken true mahogany is to mix in a bottle of the proper size one ounce alkanet root, two ounces aloes, two ounces powdered dragon's blood, with two pounds of 95 per cent. alcohol. Cork the bottle tightly and let stand a few days, then strain. Before using this stain, go over the wood with dilute nitric acid, using one ounce C. P. nitric acid to nine ounces of water. When the wood is dry go over it again in the places that should be darker. After the wood has thoroughly dried, apply the stain as often as is required to obtain the desired dark effect. Finally when the stain is dry the surface is oiled or varnished and then polished. There is no method that will give a cleaner effect than this; bichromate of potash does not give the redness required.

—416—

Silver Gray Effects on Natural Woods.

For small parts of wood that can be steeped in a solution the best method is to boil seventeen ounces of orchil paste in seven pints of water for thirty minutes. The wood is first treated by dipping in this solution, letting it remain in the latter for a few minutes, then let it drain; before it has dried steep it in a bath or shallow vat of nitrate of iron at 1 degree Be. An excess of iron gives a yellow toned gray, otherwise a bluish gray is obtained, which may be converted into blue, if so desired, by washing over with a solution of potash.

For large surfaces, where dipping is not convenient, a wash is made by dissolving one part by weight of silver nitrate in fifty parts of weight of distilled water. Apply this wash twice, then go over it with commercial hydrochloric acid and after the wood has dried go over it again with a wash of aqua ammonia of ordinary strength, say 16 degrees to 18 degrees Be. Allow the wood to dry in the dark as much as possible, then finish in oil or varnish, as may be desired.

—417—

Staining and Finishing a Violin.

The true Cremona varnish is of unknown formula and its preparation one of the lost arts. To stain, varnish and polish a violin is a special art and requires expert knowledge, but we will give you an idea of how the work is accomplished.

The German violin makers stain the violins with a mixture of campeachy wood, three parts by weight, and yellow dyewood one part, boiled for two hours in five times its weight of water in an earthenware vessel, as iron would make the stain black. This is strained, after cooling, through a fine cloth, and a little alcohol is added to it. It is applied to the violin with a cloth and wiped out. If not the right effect, apply the stain as often as required to give the proper tone. The varnish is made by dissolving in thirty-two ounces of 95 per cent. rectified alcohol, six ounces gum sandarac, two ounces gum shellac, one ounce gum mastic, two ounces gum benzoin, two ounces Venice turpentine. The last named ingredient is added, when all the gums are dissolved and all is strained through fine muslin. Apply with a clean varnish brush and polish with sweet oil and rotten stone. The ingredients for both stain and varnish can be procured from any wholesale drug firm.

—418—

Staining Broom Handles in One Operation in Gloss Finish.

How can broom handles be stained without going to much expense in material and labor? The handles, which are maple, were stained with black and mahogany water stain, then given a coat of glue size, and finally a coat of varnish applied with a brush, but the process is too slow. A process similar to that used for coating lead pencils might be the right one.

You would find it a very expensive plan to use the material employed for coloring and finishing lead pencils. Some of these are finished with spirit or collodion lacquers, while others are dipped into high priced colored varnishes. A simple and cheap plan would be to either make or purchase a colored one-coat dipping varnish, into which the broom handles may be dipped and then hung up to drain. The dipping varnish may be prepared by mixing black ground in japan or varnish, or for mahogany, Bismarck brown, ground in japan or varnish, with a good hard-dry mixing varnish, which need not be a high priced turpentine article but may contain benzine as a solvent.

—419—

Finishing Gun Stocks in Black Walnut.

For a good black walnut stain make a thin shellac size by mixing five ounces orange shellac, one ounce gum sandarac, and one drachm Venice turpentine or Canada balsam in one-half gallon spirits of wine (95 per cent. alcohol). Shake frequently until all is dissolved, then add one-half pound burnt umber and one-quarter pound ivory bone black, all finely powdered. Put all the ingredients into a jar, cork up well and shake frequently, until the mass is well mixed. Apply one coat with a brush and when this is dry and hard, rub down with finest sandpaper or steel wool. If not well stained or rubbed through, give a second coat, and rub with flour or pumice and water. Clean up thoroughly, then apply clear rubbing varnish or pale orange shellac. Rub thin again with pumice and water, then give another coat of varnish or shellac, rub again and then polish with rotten stone and sweet oil. If the work is to be hurried, use pale orange shellac, otherwise a good, hard-drying rubbing varnish. See that every

coat is good and hard before rubbing and allow ample time after rubbing and cleaning up before applying the next coat.

This method will work well on any kind of hardwood, while when water stains are employed, the stain requires to be selected according to the nature of the wood.

—420—

How to Prepare Deeply Penetrating Ebony Stain.

Much depends on the nature of the wood that you desire to stain. Soft woods will take the decoctions readily, while the hard woods have great resistance.

For hard wood, such as walnut, boil 40 parts by weight of gall nuts, 4 parts of rasped logwood, 5 parts of copperas and 5 parts of verdigris in soft water for at least one hour; strain the mixture through linen and apply to the wood while warm. Then give it four coats of iron filings that have been dissolved in three times their weight of vinegar, one-half pound copperas, one-quarter pound Prussian blue, two ounces nutgalls and two pounds extract of logwood, and then adding a half pint measure of ferric oxide, will do the work, if applied warm, after straining.

—421—

Staining Redwood a Dark Green and Filling Redwood.

As you are to match furniture that has been finished in green, you cannot employ the usual method of using a verdigris solution in strong vinegar, but must make up a pigment oil stain. Not knowing the exact tone of the green you wish to match, we cannot give you a formula for the colors required to produce the stain, but would give you the following as a guide:—

Take chemically pure chrome green in oil as near the shade of the green on the furniture as it is possible to obtain it, and if not dark enough, add Prussian blue or drop black or both of these. Break up the color thoroughly with japan or liquid drier to the consistency of thick cream, then thin with pure spirits of turpentine until it is as liquid as a thin varnish. Strain through cheese-cloth or very fine sieve, and test the resulting stain on a piece of redwood. After the stain has been applied with the brush, it is allowed to set and then wiped out with a piece of soft cloth, and the effect can be varied according to the length of time allowed before wiping out. The color of the varnish must also be taken into consideration in matching the stain, and the stain must not be applied after the redwood has been filled. If it is intended to fill the redwood, it must be done after the stain has dried, and the best filler for the purpose in this case is to take one ounce of the green that has been used in making the stain, about a tablespoonful of raw linseed oil and two tablespoonsful brown japan and one quart of turpentine, mixing thoroughly and beating into this one pound of cornstarch, and strain through a paint strainer. Apply with a brush, as you would varnish, and let it stand fifteen or twenty minutes, and rub off the surplus filler with excelsior or soft rag, then allow the surface to remain undisturbed for at least twenty-four hours. Now give one or two coats of white shellac varnish, which, after hardening, rub down with flint paper and finish with as many coats of varnish as you can afford to give. For a first-class job, two coats of shellac should be given after staining and filling, and two or three coats of rubbing varnish, then it should be rubbed with pumice and water, cleaned off after standing a day with chamois, rubbed with water and rotten stone, standing again a day, washed clean as before, then rubbed with olive oil until dry.

To fill redwood for natural finish, use the filler as described above, with the exception that the one ounce of green is omitted and a few ounces of burnt sienna substituted. The filler tends to harden the fiber of the wood, and the finish should be similar to that outlined above.

—422—

Method of Staining Oak Black.

The most effective way to stain oak black, making the stain penetrate deeply into the wood, is to take iron filings, place them into a strong stoneware pitcher or strong glass jar, pouring over this a mixture of equal parts of oil of vitriol and soft water, stirring the decoction frequently with a glass rod or wooden stick until the liquid has assumed a greenish color. This liquid is applied to the oak repeatedly until the black effect desired is obtained, and then the surface is rinsed with weak soda water, and finally with clear water and allowed to dry. The solution should be applied with a swab made by tying old cloth around the end of a stick, and great care taken to keep the acid from touching the hands, face or clothes. Nor should the solution be allowed to stand about the shop, except it be properly labeled as to contents, and well covered.

This makes a good neutral black stain, neither of the bluish tone of the aniline blacks, nor the brownish tone produced by other decoctions.

If a deeply penetrating stain is not required, a decoction made by boiling green walnut shells in water may be substituted, but four or five applications will be required. A nut gall solution, to which a trifle of sulphate of iron (copperas) has been added also produces a good stain, but none will penetrate so deeply as the first mentioned.

—423—

Method of Obtaining a Stain for Mahogany to Imitate Old Mahogany.

If you want good, durable work, make your stain by using good burnt sienna in oil, to which add a trifle of red lake to enrich it, or a little drop black to darken it, using turpentine for thinning and add japan or liquid drier to hasten its drying. Should you desire quicker drying, make red sanders stain, to which add enough asphaltum to obtain the required depth. To make the red sanders stain, buy a pound or so of red sanders from any wholesale druggist; fill any size bottle about one-quarter full of red sanders and fill the bottle with alcohol. This will extract the color from the sanders, and when it appears strong enough strain the liquid and throw the grounds away. To mix the red stain with asphaltum varnish the latter must be thinned down with turps until it is of the same consistency of the stain, or they will not mix. Dragon's blood will also make a beautiful stain for mahogany, but it is too expensive. We cannot inform you as to the quantities required to obtain the proper depth to match any given sample, but think that you can work this out on the lines given.

—424—

Formula for Making Oil Wood Stains.

The following formulas are approximate, and judgment must be used, increasing or decreasing the quantity of oil color to obtain the desired result. The beauty of the stain depends on the richness of tone and the fineness of grinding of the oil colors employed.

Cherry Stain.—To two pounds burnt sienna and one pound raw sienna, add one-half gallon boiled linseed oil, one quart best brown japan and one-half gallon spirits of turpentine. If the burnt sienna is more of a brown than of the fiery red tone, then omit the raw sienna but use three pounds burnt sienna in place of two.

Mahogany Stain.—To two pounds burnt sienna, one pound of rose pink and one-quarter pound of drop black, add one-half gallon boiled oil, one quart best brown japan and one-half gallon of turpentine. Vary the proportion of drop black according to the depth desired for this stain.

Light Oak Stain.—To two pounds of raw sienna and one-half pound of raw umber, add one-half gallon of boiled oil, one quart of best brown japan and one-half gallon turpentine. If the raw sienna is inferior in staining power, omit the raw umber and use three pounds of raw sienna.

Dark Oak Stain.—One pound raw sienna and one and one-half pounds raw umber, with thinners as for light oak stain. If too dark, increase quantity of raw sienna; if too light, add an ounce or two of burnt umber.

Rosewood Stain.—To one pound rose pink add one pint good asphaltum varnish, one pint best brown japan, one pint boiled oil, and one quart turpentine. If too dark, add more rose pink; if too light, use more asphaltum varnish and more turpentine.

Walnut Stain.—To two pounds of burnt umber add one-half gallon boiled oil, one quart of best brown japan and one-half gallon turpentine. Should the umber be very dark, add one-half pound of burnt sienna, but if black walnut stain is desired, add Vandyke brown in same proportion.

In preparing stains, break up the oil color first with the japan, adding little by little, then add the oil and finally the turpentine and strain. Test on new wood, and if too strong, add more thinners, using the proportions given in each case.

—425—

Simple Method for Staining Cypress and Southern Yellow Pine in Imitation of Golden, Antique and Red Oak.

As cypress wood is apt to quirl up after having been smooth planed and sandpapered, water stain is not a good material to apply, and therefore we would suggest the use of oil and pigment stain, which will also answer best for the yellow pine, as it is very pitchy, and water stains would not penetrate well into it. For golden oak stain use burnt umber in oil and asphaltum, say one pound of the former and one pint of the latter, add one-half pint of best brown japan, and when well beaten together thin with turpentine to the consistency of a very thin varnish and apply.

When the stain has set, wipe with a cloth to bring out the high lights. Try it on a strip of the lumber first, and if the effect is not golden enough add some medium chrome yellow. But you must bear in mind that golden oak is really white or red oak stained, and that you cannot obtain an effect quite similar on the woods you mention.

For the antique oak stain use a good raw umber in oil, say one pound, and two pounds of Vandyke brown in oil, to which you may add, if required, one-half pound of drop black in oil and one pint of best brown japan. After beating these well together, thin with turpentine in the same manner as the golden oak stain and apply, proceeding as above.

To imitate red oak, make a stain from strong Venetian red and add a trifle of drop black to subdue the glaring redness.

It is self-evident that the colors must be of the utmost degree of fineness and strength, as yellow pine is rather difficult to stain.

—426—

How to Stain and Finish Flemish Oak.

Flemish oak is a nearly black effect, without either the brownish or bluish tinge, therefore the stain must produce a greenish black tone. A strong decoction of green walnut shells applied repeatedly will best bring the desired effect. If not deep enough, a solution made by dissolving sulphate of iron (green copperas) in water or by steeping iron filings in vinegar for a few days is applied over the walnut shell decoction until the proper depth of color is secured. Such stains penetrate more deeply, do not hide the grain and produce the aged appearance, which oil or pigment water stains will not give. Articles of small size may be most effectively stained or aged by placing the pieces in an air-tight chest with a shallow dish full of liquid ammonia, but it requires more attention and time.

After the wood has assumed the desired color allow it to dry in the air, and color some good paste-wood filler with raw umber and drop black; thin the same with turps to the consistency of varnish, and apply with a varnish brush of appropriate size. When set, wipe off the surplus filler with cotton waste, excelsior shavings or flax tow across the grain and allow the filler to harden; then sandpaper and dust off. Now proceed as you would in finishing any other style of oak, according to the price obtained for the work, or as per specifications.

It is always desirable in finishing Flemish oak to give at least one coat of orange shellac varnish to seal up the filler before applying the varnish, and it would be a waste of money and time to apply two coats of white shellac varnish, which would certainly be required, as the white shellac is not as good a sealer. The shellac coating should be rubbed down with No. 0 sandpaper, but care must be taken not to rub through the coat. When this sandpapering is done, the work is ready to be varnished in any manner desired.

—427—

Green Stain for Woodwork.

To make a good green stain for woodwork take chemically pure green, ground in oil, for the proper shade, and add japan sufficient to make it dry and thin the resulting mixture with spirits of turpentine or naphtha. If too bluish, add chrome yellow; if too yellowish, add Prussian blue or drop black, or both blue and black. If the stain is strong, thin it out more. Fine green stains may be produced from aniline greens, but they are not fast to light, as a rule.

—428—

How Shingle Stains May Be Made With Creosote.

Very little experience is required to prepare or mix shingle stains, using creosote as a vehicle. Dry pigments, such as mineral red and brown, ocher (yellow or red), Vandyke brown, burnt or raw umber, burnt or raw sienna, lampblack, zinc white, etc., may be employed either singly or in combination as the staining material. The pigments must be in powdered form, impalpably fine and bone dry and are sprinkled into creosote oil while it is agitated by stirring. For dipping purposes less pigment is to be employed than when the stain is applied with the brush. A simple method of mixing the stains is to take oil paint of the requisite color, thin the paste as it should be for outside surface, then add as much creosote oil as there is paint and it is ready for use.

—429—

Staining Woodwork with Acids.

For staining wood brown, sulphuric acid, more or less diluted, according to the depth of stain desired, is applied to the wood, previously cleaned and dried with a brush, and when the acid has acted enough its further action is arrested by the application of liquid ammonia.

To age oak artificially, liquid ammonia is laid on with a rag or brush, which does the work rapidly and effectually.

To darken cherry, rub it over with nitric acid of 1.2 specific gravity, and after permitting it to stand for twelve hours, wash and dry thoroughly. Nitric acid gives a permanent yellow stain, which may be converted into dark brown by subsequent application of tincture of iodine.

A hot, concentrated solution of picric acid gives a very fine yellow effect. Aquafortis, diluted with three times its own weight of rain water, brushed over the wood, gives a more true yellow effect than the undiluted nitric acid (aquafortis).

A bright golden yellow stain is made by digesting one-half ounce of powdered madder for twelve hours in two ounces of sulphuric acid and then filtering through cloth. The articles to be stained should be immersed in the fluid for three or four days.

—430—

How to Stain a Violin.

The staining and varnishing of violins is a special art and requires expert knowledge, if the tone of the wood is to be preserved. The wood must be stained before the varnish is applied and the stain should be made from camwood, logwood or rosin for red, for yellow from annatto aloes, gamboge or turmeric, using alcohol and water as the medium. By mixing red and yellow in various proportions, intermediate effects may be obtained in the staining. The coloring matter is boiled in water and when cool the liquid is strained and a little alcohol added to keep it in good condition. The stain is applied, allowed to set up and then wiped out with a soft cloth until the proper effect is had. If not deep enough, a second application is given. Before applying the varnish, the stained surface is gone over with the very finest sandpaper. The varnish should be a spirit varnish, made by dissolving 4 ounces of gum sandarac, 2 ounces pale gum shellac, 1 ounce gum mastic and 2 ounces benzol resin in 32 ounces of 95 per cent. grain alcohol, to which solution, when complete, 2 ounces clear Venice turpentine is added to make it flow from the brush freely. To make an extra fine finish, each coat of varnish is rubbed lightly with flour of pumice and water. Three light coats of varnish are required until a surface fit for polishing is obtained. The last coat of varnish is polished with rotten stone and sweet oil and finally by rubbing with the palm of the hand.

—431—

Black for Imitation of Ebony.

A black more intense than drop black toned up with Prussian blue was desired, in order to make a stain in imitation of ebony.

Gas carbon black is the strongest of all insoluble blacks, but its tone is too brownish for a good imitation of ebony. There are, however, aniline blacks, known to the trade as oil blacks because soluble in oils, and one of these will suit your purpose best without doubt. Ask your supply house to obtain samples of such for you, stating with what mediums you wish to use them. They are fairly permanent and well suited for the work you mention.

—432—

Creosote Shingle Stains and Linseed Oil Stains.

Creosote stains for shingles have come in such high favor through the belief that they have highly preservative properties, preventing dry rot in the wood and also from the theory that creosote stains are antiseptic and do not affect the water that in many localities is collected in cisterns from roofs of houses and barns, while there is a general idea that paint acts injuriously upon water so collected and makes it unfit for the use of man or beast. While we do not share such belief we are of the opinion, and, in fact, know, that a creosote stain, when well made, will answer the purpose of protecting shingles against dry rot, etc., better than a linseed oil stain, because it penetrates deeper into the wood and being very slow to dry lasts longer and does not require repainting one-half as often as ordinary linseed oil stain or paint. Another point in its favor is that on shingles well dipped into creosote stain before they are laid, and given another coat after being in place on a roof or on the gable end of a cottage, mildew or fungus growth cannot establish itself upon it, as is the case with oil stains with mineral or earthy paint bases. In our own experience we found that a stain made from inert pigment, ground in oil, thinned with pine tar, liquid drier and benzine or kerosene, and applied to the shingles the same as creosote stain, the shingles being laid on neighboring roofs, preserved the shingles fully as well after an exposure of four years, the oil and pine tar stains had held their color better. In another instance, where linseed oil paints, white and moss green, were simply thinned with benzine, into which preparation the shingles were dipped, then laid and given a coat of the stain, the color held out well, but the shingles showed dry rot in many places and required relaying. You will find it a difficult matter to overcome the tendency to favor creosote shingle stains.

—433—

Sea-Green Stain for Whitewood.

Take chemically pure chrome green, light, ground fine in linseed oil and enough raw sienna in oil and mix the two in sufficient quantity to produce proper effect, then thin with one part boiled linseed oil, one part brown japan and two parts turpentine, making the mixture very thin; apply with brush or cloth and when set wipe across the grain.

—434—

How to Imitate Cypress by Graining.

The grain of cypress is somewhat like that of yellow pine, but is broader in the heart and finer grained. The graining in imitation of cypress is done in oil only. The ground should be a little darker than that which is used for oak. For graining color raw and burnt sienna and burnt umber is mixed in oil with the usual quantity of japan. When the color is put in the hearts are wiped out in the usual way. A rubber comb may be used to make portions of the heart, but care must be taken that the lines made by the comb follow those made by the hand. The steel combs should not be used over the lines made by the rubber comb, and a very thin glaze is only needed to finish cypress graining.

—435—

Mahogany Oil Stain for Whitewood.

We should suggest the use of a pigment and oil stain, spirit stains being too costly and water stains apt to warp the wood. The oil stain to be applied on the

finished wood, after it has been smooth sandpapered. When dry, a coat of liquid filler and a coat of varnish will produce a desirable finish. The oil stain may be made by beating up, say two pounds burnt sienna in oil, three-quarters pound rose pink in oil, and one-quarter pound Vandyke brown in oil, with one-half gallon boiled linseed oil; one quart best brown japan, and one-half gallon turpentine (or benzine). Beat up the colors in the japan, adding it little by little until they form a smooth mass; then gradually add the other thinner, stirring in the meanwhile. Put the stain through a paint strainer before using. If too strong, add more turps or benzine; if not strong enough, use more color. By using the same color ground in japan, and beating them up in varnish, you can add them to liquid filler, thus staining and filling the wood in one operation, but the oil stain system will make the most durable work.

—436—

Creosote Shingle Stain Formulas.

Formula for making creosote shingle stain, giving commercial name of creosote to be used:—

A good grade of shingle stain is made by thinning the oil color required to give color to the stain with a mixture of four gallons of raw linseed oil, two gallons of creosote oil and one gallon liquid drier. The color should be permanent and non-fading and it is best to have it of the consistency of house paint, before adding the thinners referred to. If to be used for dipping, one gallon of paint to seven gallons of the thinners referred to is sufficient. For brushing, two gallons of paint should be used. For a cheaper grade, the thinners may be made by mixing three gallons water white 150 degree test petroleum oil, three gallons creosote oil and one gallon liquid drier. The commercial name of the creosote required is coal tar creosote, but crude carbolic acid may be used in its place. Neither, however, should be too dark in color.

—437—

Creosote Shingle Stains and Their Composition.

The best way to introduce pigments into creosote stains, whether they are intended for shingles or other articles of wood, is to have the pigment ground fine and smooth in linseed oil to soft paste form, so that they will break up readily. These colors should be selected in their purest form if the stain is to be used for dipping, because material extended with colorless pigment will weaken the stain, and much more of it being required will thicken up the stain to such an extent that only the liquid penetrates into the pores of the wood, leaving the excess of pigment upon the outer surface of the shingle, where it is washed off in a short time, changing the color of the surface and giving dissatisfaction to the owner and painter alike. Pigments with a base of lead or copper should be barred out, whenever possible, and shingle stains should not be used on roofs the water of which is collected in cisterns for household use unless they contain only such pigments as boneblack, lampblack, earth colors, such as umbers, siennas, ochers, oxide of iron reds or browns, zinc oxide and ultramarine. When water is not used for drinking purposes the list may be extended to chrome greens, chrome yellow and Prussian or Chinese blue, but even here white lead (the basic carbonate) should be avoided. Zinc white, ground in oil, tinted with lampblack in oil will produce a good light slate color, provided the creosote is not too dark. The zinc and lampblack mixture should be thinned to the consistency of ready-mixed paint with linseed oil and drier, and the quantity of creosote or mixture of creosote and petroleum distillates that is to

be added can be determined by trial and should be governed by the strength of the pigments used. Anywhere from 3 to 7 gallons of the thinning material to one gallon of the liquid paint will serve the purpose.

—438—

Early English Oak Finish.

This effect can be produced on white or red oak by first staining the wood with a stain made from burnt umber and raw sienna and a trifle of drop black. After stain has dried the wood, if filled with paste filler that is tinted the color of the stain, may be finished with wax or varnished, rubbed and polished, or with a flattening varnish and so left in dead luster.

—439—

Fumed Oak and Green Fumed Oak.

The effects desired are best obtained with water stain. Boil one ounce catechu (gambier) in 2 pints of water, strain the liquid and apply it hot to the wood. When this has dried, brush over with a solution of one ounce bichromate of potash in not over one and one-half ounces of water. Should this not be deep enough give a second application of the bichromate of potash solution. This treatment will give you the fumed oak effect. For green fumed oak use a similar treatment, but add a trifle of soluble Prussian blue to the bichromate of potash solution, enough to produce a greenish effect, such as you desire in the grain.

—440—

Finishing Oak in Mission Effect.

There are different ideas about the exact finish of mission oak, some pieces being finished without filler, simply stained and waxed or oiled, others stained, filled, varnished, rubbed and polished. There is no set rule excepting that the finish must not be on the bluish or brownish black, like ebony or Flemish oak finish, but of a slightly greenish black hue with a faint trace of red. The oak should be first stained with a pigment stain composed of lampblack and a tinge of chrome yellow and a trifle rose pink, thinned with some japan drier and turpentine. When the stain has dried, one application of a mineral filler stained with a little of the stain is sufficient to fill the grain, but the filler must not consist of cornstarch. The filler is best made from silex, 6½ pounds, 1 pound raw linseed oil and 2½ pounds hard gum rubbing varnish, run through a hand mill and thinned with turpentine.

—441—

Preparing Golden Oak Spirit Stain.

Formula for a rich, dark golden oak spirit stain, to make one quart at a time:—

Steep one ounce of powdered gall nuts in one pint of alcohol and let stand well corked for two to three days, then strain the solution, which should be black. Dissolve Bismarck brown in alcohol, say one-half ounce in one-half pint of alcohol,

then strain and add to the other solution. This will make 1½ pints. Add a finger thimbleful solution of tin and enough alcohol to make the total quantity one quart. Reduce the proportions here given to the smallest possible minimum before making a quart, as you may have to change the proportions of the solution somewhat to obtain the effect desired. Should the Bismarck brown produce too red an effect, then use a solution of saffron in alcohol in its place. The alcohol we refer to is the denatured article, as strictly pure grain alcohol is rather high-priced for a stain and wood alcohol is injurious to the eyes of the operator.

—442—

Staining Willow Furniture.

In order to make stains take well on willow work, you must first give it a wash made up of 9 ounces chloride of lime, 1 ounce soda crystals, dissolved in 5 parts of water. Go over the wood with this solution several times, then wash with a weak solution of sulphuric acid in water, and rinse immediately with clear water. This will make the stain take uniformly. Alcoholic aniline stains will be best for the purpose, as they will penetrate more deeply than oil stains or water stains. If you prefer to use the latter you should apply them hot. Try the method first on inexpensive material, because it requires some practice and judgment to give the willow the proper roughness to make the stain bite.

—443—

Formula for Golden Oak Stains.

The best means to bring out the effect called golden oak is to make a stain by mixing equal parts of turpentine, asphaltum varnish and best brown japan, thinning this mixture down with turpentine to the fluidity of water, applying same to the natural oak with a soft brush and before it has time to set hard wipe the surplus off with soft cloth across the grain to bring out the flakes or high lights, which will show these up yellow, the subsequent filling and varnishing bringing out the so-called golden effect. This is for interior work. When it comes to exterior work, such as for front doors or whenever it is to be exposed to the weather, a pigment stain and filler is more durable. In that case the stain is best made from burnt Turkey umber, a trifle of raw Italian sienna and Vandyke brown, all ground in oil, thinned with best japan drier and turpentine to fairly thin consistency. If the stain is to be very deep in effect, omit the raw sienna, and add a little drop black, but avoid a blue black. The treatment is similar to that for indoor work, but the stain will not set or dry as quick. For the filler, use a mineral paste filler tinted to the depth of the stain with burnt umber and drop black. A good outside or spar varnish should be used as a finish.

—444—

Staining Leather Upholstered Chairs.

To stain or dye a light wine color over a very light vermilion on leather upholstered rocking chairs:—

We understand that the woodwork of the chairs is now a bright vermilion red color, and that you wish to change it to a light wine color without removing the vermilion red. If so, we would advise you to remove all the gloss, if such there is, on the woodwork with the aid of sandpaper, dust the work, and then thin down some manufacturer's light wine color ground in japan with turpentine, as you would for painting a buggy or carriage gear or body, give one coat of same, let it dry good and hard, then finish with a good chair varnish. To make an extra good job, use a good cabinet rubbing varnish in place

of the chair varnish, let it dry hard, then moss it down with fine pumice flour and water, wash clean, dry with chamois leather and then apply a flowing coat of cabinet or seat finishing varnish. On cheaper work you can make a one coat job by going over the vermilion after sandpapering with color varnish made from wine color in japan and a good hard drying varnish.

—445—

Ebony Water Stain and Flemish Black Oak Stain.

One stain will answer for either of these. Dissolve one-quarter pound of aniline black (nigrosene B) in one gallon boiling water and add one-half pint vinegar as mordant.

—446—

Staining or Dyeing Floor Matting in Old Rose Color.

Writer wishes to have straw floor matting dyed or painted old rose to match the hangings of a room. Has tried Diamond dyes with white lead for color and shellac varnish, which does not penetrate sufficiently and flakes off. Also tried stain made with varnish, also with oil and turpentine with no better results.

You cannot dye or stain straw matting, or as a matter of fact, any straw goods, without first preparing the straw in such a manner that the stain or dye will penetrate into the fiber. There are many ways of doing this, but the best method is to steep the straw in a bath of water, acidulated with sulphuric acid, and keep it in the bath for twelve hours. For every ten gallons of water used in bath, add two pounds of oil of vitriol 66 degrees Be. Pour the acid into the water, not the water on the acid. This must be done about fifteen minutes before the straw is steeped in the bath. After twelve hours take the straw from the bath, rinse in clear water and steep it in the dye, which may be prepared as follows:—Dissolve sufficient magenta red dye in hot water and keep it at a temperature of between 90 and 100 degrees F. Let the straw remain in this bath until the desired color is obtained, then remove and rinse the material in clear water and dry it in the air. When thoroughly dry, a very thin coat of white shellac varnish will give it a finish and will, in a manner, protect the dye.

As magenta red is rather deep, the bath must be made rather weak to produce the color of old rose on the straw. It may be necessary to add some saffranine G. with the magenta red. Your supply house can obtain the dyes for you, together with the necessary information as to quantities required to a certain amount of water and the necessary mordants. There is still another way to color the matting by means of a spirit stain, which would be the simpler method, but not as effective in penetrating the fiber. Make a cochineal solution by boiling at gentle heat cochineal in double its own weight of ammonia water until the smell of ammonia is no longer discernible. The residue is mixed with alcohol and filtered. But the acidulated water bath above referred to cannot be dispensed with, otherwise the stain will not penetrate deeply enough. If cochineal produces too deep a stain for the old rose effect, add orange aniline, that is soluble in spirit, sufficient to overcome the crimson tone of the cochineal. It is just possible that your supply house can obtain for you one or more spirit soluble anilines that will produce the right effect.

—447—

Fuming Oak Extra Dark with Ammonia.

Is there a way of introducing tannic acid into oak so that a darker color may be produced by fuming it with ammonia? What other materials or acids are used for fuming?

We do not know of any book giving the information desired. Fuming oak with ammonia vapors produces some very dark brown shades—it all depends on the strength of the ammonia and length of time of exposure. Much depends upon the nature of the oak, and there are some American varieties of oak that are rather poor in tannin. No doubt, if the wood could be impregnated with tannic acid by subjecting it to pressure, as is done in fire-proofing wood, it would help some, but we do not think that a mere sponging with tannic acid would do much good. Still, there is nothing like trying. If you use concentrated ammonia, however, you will find that you can make the wood very dark and still not raise the grain.

—448—

Staining an Old Varnished Surface.

A spirit stain or any other kind of stain for hard wood that will penetrate through old varnish on such surface without requiring the removal of the same, and that may be varnished over again.

There is no preparation of any kind known to the trade that would do the work mentioned. The only way to obtain the effect of stain on a painted or varnished surface is to remove whatever gloss there may be by sandpapering or rubbing with steel wool and then apply a coat of paint that will resemble the stain desired, having it dry flat and then finish with varnish. But no matter how skilfully done, experienced persons will discover at a glance that the effect is not that given by the original staining of the wood, because the grain of the wood is obscured.

—449—

Staining Gumwood in Imitation of Circassian Walnut.

We have not at any time published a recipe for such a stain, nor can we give positive information on the subject. So far as we know, Circassian walnut is much lighter in color than English walnut, similar to dark tanned leather, and if an oil stain is more desirable it may be made from raw sienna and burnt umber in oil, thinned with either, or a mixture of turpentine, benzine and benzole, adding sufficient drier. For a water stain dissolve 2 parts permanganate of potash in 30 parts hot water, all by weight. Sponge the wood over with this solution until the right color is obtained. If any of our readers are in position to give more accurate information on the subject we should be very glad to have it.

—450—

Golden Oak Water Stain with Aniline Color.

The only good permanent water stain made from coal-tar derivatives and which will produce on oak a fairly good golden oak effect is made and used as follows:—One ounce of commercial alizarine is dissolved in twenty ounces, by weight, of water, then aqua ammonia is added to this drop by drop, until the odor of ammonia in the solution is perceptible but it must not be overdone. This is then applied to the wood as a stain and permitted to dry, when the wood will be colored a strong yellow brown. Now two drams of barium chloride is dissolved in one pint of water, and this solution applied over the stain, when the wood on drying will be decidedly brown of the golden oak effect. The other requirements will depend upon the nature of your paste filler, as well as on the varnish and final finish or polish.

—451—

Staining Wood Finished in Golden Oak.

You cannot make a good lasting job by staining over a varnished surface because, when a stain is applied over this, it has too much the appearance of being painted. The grain becomes obscured, thereby spoiling the effect of the finish. The only way we know of that the object might be obtained would be by using a high grade of rubbing varnish, to which is added sufficient pure turpentine asphaltum varnish to produce the desired depth of color, and yet retain sufficient translucency to not obscure the high lights in the finish.

—452—

Water Stain That Does Not Raise the Grain.

The formula reads as follows:—Boil 4 ounces of catechu in six pints of water and apply to the wood; when dry, brush it with a solution of one ounce of bichromate of potash in one and one-half pints of water. The turpentine may be mixed with the warm stain, but catechu does not make a good walnut color, and we would suggest the use of a stain made from 24 ounces of soluble Vandyke brown in one gallon of boiling water, to which two ounces of ammonia of 18 degrees is added. Here is where the addition of pure spirits of turpentine is beneficial in preventing the stain from raising the grain. This stain is very permanent and on account of its being mordanted with ammonia it will penetrate more deeply than that made with catechu, and the fixing of the stain with bichromate of potash solution can be dispensed with.

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Glazing Liquid for Staining and Mottled Effects.

What makes the best glazing liquid for staining and mottled effects; one that will not set too quickly and will not run, also how should the ground colors be mixed and applied?

A liquid for the purpose named is best made from a pale varnish, one that will dry in, say, twelve hours when applied to interior work. As you have failed to state what particular kind of staining you have in view, we are unable to give approximate figures for thinning the varnish with turpentine, but would judge that two parts by measure of varnish and one part of spirits of turpentine would be about right. The varnish should be of the grade that is sold as high grade interior varnish, and when this is used for making a glaze with color ground fine in linseed oil it should dry inside of twenty-four hours, and when applied over the proper ground color it should flow out freely, level down uniformly and should not run.

However, when used with slow drying colors like lakes, rose pink, drop black, vandyke brown, etc., it may be necessary to add some japan drier in addition to the liquid. The ground for these glazes or stains should be oil paints, held so high as to dry with no higher than egg shell gloss, similar to graining grounds, and for mottled effects especially, the tone and shade should be so made as to give the effect desired when the glaze has been mottled or wiped with a cloth.

—454—

Paste Filler and Oak Stain for Pine.

In oil stain there are several varieties, pigment stain and aniline color stain. In water stains the soluble aniline dyes can be used or decoctions of wood and other vegetable matter. Then there are varnish stains which combine coloring matter and varnish.

To produce a stain for white or yellow pine in the most simple way from material that most painters have handy at their shops:—For oil stain to imitate oak make a mixture of say one-half gallon raw linseed oil, one pint of liquid drier and one quart of turpentine or turpentine substitute. For light oak add two pounds best French yellow ocher to the mixture of oil, drier and turps, producing one gallon of stain.

For dark oak use one and three-quarters pounds of the same ocher and two ounces each burnt sienna and burnt umber. An oil stain made by this formula will dry well overnight and will not raise the grain of the wood.

As to paste wood filler, any of the mineral substances such as silica or silex, talc, gypsum, china clay or even barytes can be used, also cornstarch or flour, but the more transparent the pigment is the less it will obscure the natural color of the wood or when the wood has been stained the filler should not dull the color of the stain.

When a painter desires to make paste filler for his own use the best way is to mix raw linseed oil with a high grade of japan, say, three parts oil to one part japan, adding enough silex, finely ground, to make a paste, running it through a hand mill, and when using thin the paste with turpentine, turpentine substitute or benzine to the consistency of varnish. If to be colored, use color ground in oil.

—455—

Stain for Imitating Circassian Walnut.

The best Circassian walnut effect that we have noticed on furniture would be produced by mixing burnt Turkey umber and raw Italian sienna, both ground in linseed oil, about two parts of the former and one part of the latter by weight, beating the colors well together, then reducing with japan drier and thinning to the right consistency with turpentine for good work or with turpentine substitute for ordinary work of a cheaper class. A moderate percentage of solvent naphtha or coal tar benzol would give better penetration. The richness of the stain depends upon the quality of the colors.

—456—

Red Oil for Use on Raw Furniture.

Red oil is linseed oil (boiled) in which has been steeped alkanet root until it attains a rich red color. One pound of alkanet root is sufficient for one-half gallon of oil, and the oil is best kept in a wide-mouth glass jar, well corked. For use the oil is strained through cheesecloth and if wiped over natural mahogany, rosewood or walnut before filling and left over night, imparts a rich tone to these woods.

—457—

Gray Acid Stain for Cedar or Pine Wood.

Use three solutions to obtain a good gray effect on wood with an acid stain. First a solution of gall nuts, then a solution of iron sulphate, and finally an indigo solution. Each application must have dried by evaporation before the next is put on.

The solution of gall nuts is made by steeping powdered gall nuts in denatured or wood alcohol and straining after standing at least twenty-four hours. Sulphate of iron solution is produced by dissolving green copperas in denatured or wood alcohol. Indigo solution is made by dissolving powdered indigo in four times its weight of oil of vitriol (66° Be. sulphuric acid). Allow to settle, decant the clear blue liquid and dilute with water, according to the strength desired, but allow the mixture to cool before using. The depth of stain can be regulated by more or less dilute solutions.

A water stain having a good gray effect, which is also sometimes termed acid stain, is applied as follows:—Dissolve in 50 parts by weight of water one part silver nitrate and wash over the wood. Allow to dry, then wash with dilute hydrochloric acid, and finally with ammonia water. When dry, finish in any way you may desire.

—458—

Hastening the Drying of Creosote Shingle Stains.

If you use colors ground in linseed oil as base for the stains it is only necessary to add enough oil drier to make such colors dry in the same time as a regular oil paint, say about one pint of drier for every ten pounds of oil color used, unless the color contains appreciable portions of ocher, raw sienna, drop black or lamp-black, when the quantity of drier may be increased, even doubled. A good liquid drier is preferable, but an excess is not to be recommended, because it would keep the stain from penetrating well into the shingles. Shingle stains should not dry like paint, merely set to the touch within reasonable time to handle and not wash off in driving rainstorms.

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Acid Test for Georgia Pine to Produce Blue Gray Effect.

For light blueish gray, wash over the surface with a sulphate of iron solution, let it dry, then wash over with indigo solution. The sulphate of iron solution is made by dissolving green copperas in alcohol (wood alcohol is best). The indigo solution is made by dissolving indigo in four times its weight in 66 degrees sulphuric acid (oil of vitriol), allowing it to settle, then diluting with water. If a dark gray is wanted, apply tincture of gall nuts, before applying the sulphate of iron solution, otherwise proceed as for light blueish gray. When dry, sandpaper lightly and wax.

—460—

Fuming Oak and Imitating Fumed Oak by Staining.

The fuming of oak is done by the vapors of ammonia, which act on the tannic acid in oak, producing a uniform brown color that cannot be obtained with any water, spirit or oil stain in its soft effect, and another advantage of fuming oak is that the grain of the wood is not raised. The process is as follows:—If the articles to be fumed are of moderate size an air tight case or box fitted with racks on which to place the pieces of wood is placed with the open end on a level floor, on which are a number of shallow porcelain or glass dishes filled with ammonia of 26 degrees Baume. The articles are allowed to remain in this apparatus until they have assumed the desired color. When the articles are large, such as furniture, they should be placed in a room of suitable size that must be practically air tight by having windows and doors securely fastened. There should, however, be a pane of glass in the door, through which observation as to the progress of the fuming may be had without opening the room until the process is complete. In a room of 12 by 16 feet the distribution in suitable dishes of one gallon of 26 degrees ammonia over the floor of the room will be sufficient if the room is kept closed for about twelve hours. The articles to be fumed must be so arranged that the ammonia vapors can circulate freely about the surface that is to show the effect of treatment. When the articles are taken from the room or other apparatus they should be given a good airing in order to have the vapors evaporate previous to finishing the wood with wax or paste filler and matt varnish, which is the only proper finish for fumed oak articles of furniture.

When the fuming process is not practicable the effect can be obtained by attaching a sponge to the end of a stick, dipping it into 26 degrees ammonia and

so applying it to the surface. Of course, in this case the grain of the wood will be raised more or less and make sandpapering necessary before finishing, as above noted. A solution of bichromate of potash in water, say two ounces of the potash in three pints of water, if applied repeatedly over the surface will also produce a fumed oak effect. Still better is a wash made by dissolving one ounce of catechu (gambier) in thirty fluid ounces of hot water, permitting the wood to dry and then brushing it over with the bichromate of potash solution referred to above. While these washes do not give quite as good an effect as fuming, they are far better for the purpose than an oil or spirit stain.

—461—

Adding Glycerine to Water Stains.

The addition of glycerine has been suggested by some one in connection with cornstarch to keep water stains and acid stains from raising the grain of the wood, but we strongly disapprove their use for the reason that cornstarch acts as a filler and will not allow the stain to penetrate deeply, while glycerine is apt, on account of its greasy, non-drying property to give trouble, when the surface is varnished. The addition of a moderate quantity of spirits of turpentine to the water stain will keep the grain down, say one-half pint to one gallon of stain, and there will be no trouble in varnishing the surface when the stain has dried. The stain should be made fairly warm, when the turpentine is added.

—462—

Finishing Oak in Antique Green.

Beat up one pound raw Italian sienna of yellowish tone, that is ground in oil, adding four ounces of burnt umber in oil and from two to three ounces medium chrome green in one pint of liquid drier. Then add three pints spirits of turpentine and enough raw linseed oil to make one gallon of stain. Apply this to the dressed lumber after sandpapering and dusting and allow to dry. Use antique oak paste filler or, if you do not care to purchase this, color some natural paste wood filler with burnt umber and a little chrome green, following the usual method of using paste fillers. Finish as may be desired with rubbing varnish and finally with finishing varnish.

—463—

Staining Whitewood, Also Chestnut, in Imitation of Mahogany.

For imitating mahogany finish on whitewood (poplar) or on white pine we would suggest the following:—Make an oil stain by breaking up in a pot three-quarters of a pound of burnt Italian sienna in oil and one-half pound maroon lake or rose pink in oil, beating the paste well with a stick or paddle, then add one-half pint strong liquid drier. Stir this into the paste, and when mixed add one and one-half pints of pure spirits of turpentine; stir again until well mixed, then strain and add to the strained semi-liquid so produced enough linseed oil, raw or boiled, to make one gallon. As there are so many fanciful mahogany stains, some almost as rich as rosewood, you will have to establish your own standard, which you can accomplish by cutting down the quantity of burnt sienna and increasing the maroon lake or rose pink, or if you wish to match old mahogany, you can add some Van Dyke brown in oil to the sienna and rose pink. One coat of this stain applied to the dressed wood should be sufficient, and when the stain has dried a coat of white shellac varnish (that made with denatured alcohol is cheapest and will serve the purpose almost as well as the very high priced grain alcohol shellac that is practically out of commerce). Light sandpapering the coat of shellac will make it ready for the finishing varnish. This pigment oil stain does not raise the grain of the wood and makes the most durable finish.

If you wish to make a mahogany water stain you can do so by dissolving in three quarts of boiling hot water one ounce to two ounces of Birmarck brown. Let it cool, strain and set aside for use. If too strong add more water, but you will find most likely that it will require two applications. This method of staining is cheap, but may be high priced in the end, because of the raising of the grain. When the work has to be done cheaply the coat of white shellac varnish may be dispensed with and liquid wood filler applied instead.

To imitate mahogany on chestnut is somewhat unusual, as chestnut is at best a very coarse wood, very spongy, and so open grained that it is difficult to fill. But it is used very much in house finishing, though mostly left in its natural effect. You will first have to stain it, and the same composition of mahogany stain will serve as for white wood, though you may have to use it of greater strength. The stain being dry, give it a good dose of paste filler, which must be colored with burnt sienna, rose pink and Van Dyke brown (but very little of the latter). You had best try out both stain and filler at your shop on one or more pieces of the wood before going ahead with the job. When the wood has been filled the surplus filler removed in the usual way, and the filler has dried sandpaper the surface, then give two coats of shellac varnish, sanding when dry, and it will be ready for the finishing varnish or polishing if desired. The paste filler should dry out somewhat darker than the body of the stain, because then it will better imitate mahogany.

—464—

Creosote Oil for Shingle Stains.

There is sufficient creosote in this country for all purposes and of a quality that makes it fit to be used for dipping shingles to be laid on roofs, preserving them from dry rot and the ravages of the weather. There are two kinds of creosote oil—the wood creosote and coal-tar creosote. The latter is the kind that is used in shingle staining, with or without pigment. For dark colored stain the heavy grade of creosote is used, while for light stains, such as natural, without pigment, and for silver gray or other light colored stains the paler variety is preferable. But shingle stains are not usually made with creosote alone, a portion of petroleum spirit (benzine) is usually added and sometimes even kerosene. There was quite an argument as to whether wood creosote would not prove to be a better preservative for wooden shingles, but the decision was in favor of the coal-tar product, not only from the economical standpoint, but much more so from that of wear and preservation. The chief point in selecting creosote for shingle stain is to insist on a grade that does not crystallize during any kind of weather, as most coal-tar creosote or dead oil of tar will do, especially during frigid temperatures.

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Method of Finishing Birch to Resemble Mahogany.

Birch, especially the black variety, will, when properly stained, make a very fine imitation of black walnut or mahogany, being of fine grain. By manipulation of several stains feathered mahogany can be closely imitated on birch. It is first stained and may be filled with mahogany colored paste filler afterward, which will bring out the details with better effect. On top of this filler two coats of shellac varnish, when sandpapered, will give an excellent surface for polishing. As birch has almost the color of cherry wood, a very strong stain is hardly necessary, but for work that is to be filled and shellac varnished and afterward polished, we would suggest the use of a rather fast drying oil stain, made from burnt sienna and rose pink, both ground fine in oil. Twelve ounces burnt sienna in oil and eight ounces rose pink or maroon lake in oil, beaten up with one quart liquid drier or japan, to which is added one pint of good inside varnish and one-half gallon of turpentine, will make one gallon of mahogany stain that will dry reasonably quick.

—466—

Staining Southern Pine to Match Red Gum.

Mix one pound burnt Italian sienna in oil with one pint best black asphaltum varnish, beat the mixture very thoroughly; add one pint good drying japan; run through a paint strainer or wire sieve to break up any small lumps, then add one-half pint benzol and enough pure spirits of turpentine to make one gallon. Apply with a soft brush and when set wipe over with a cloth until you have the right effect. If too red, add a little burnt umber in oil; if not red enough, add a little Venetian red in oil. Finish with wax.

—467—

Fumed Oak Interior Finish.

We do not know of a stain that can be purchased in the market for a fumed oak effect. Boil one ounce of catechu in one and one-half pints of water, strain the liquid after the catechu has been dissolved, and you have a stain, which apply hot to the wood. Let this dry, then brush it over with a solution of one ounce of bichromate of potash in one and one-half pints of water. If not brown enough when dry, give another wash with the bichromate of potash solution. Red oak does not stain well, nor does it take the fuming well. Try to fume the wood in one room by closing all doors and windows, stopping up keyholes, and padding doors and window sashes with paper, first placing shallow dishes filled with liquid ammonia of 26 degrees, figuring on one gallon for a room twelve by sixteen feet. Fuming gives results most uniform on white oak. Finish by waxing.

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Stain to Imitate Effect of Fumed Oak.

About one pound of raw sienna oil, four ounces burnt sienna in oil, carried in proportion as to their staining power, toned with chrome green in oil, thinned with turpentine and liquid drier. Any tone desired may be produced on either white or red oak, adding more chrome green when stain is intended for the red variety. Best work is had by mixing the stain with paste filler for oak, or with liquid filler for cypress.

—469—

Stain for Burlap Previously Colored.

The best way to produce a stain for this is to procure the aniline color, known as oil soluble or fat aniline and dissolve it in turpentine or benzol and add enough oil to give binding properties; then thin to the consistency of stain with turpentine and apply it with the tip of a blender in stippling fashion, taking care not to splash or apply with a soft sponge and go over it with the blender before the stain has time to set. Oil soluble or fat aniline can be had in lemon or orange yellow, light and dark brown, blue, green, several shades of red and black and, while they are high in price, one pound is sufficient to produce at least two gallons of strong stain. Special dyes or stains for this purpose are made by some of the burlap manufacturers.

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Benzol in Making Aniline Stains.

If you desire absolute permanency of color in the stain, you must use an oil and pigment stain and to produce a gray effect the best material to use is lampblack ground in oil, adding enough zinc oxide, also ground in oil, say about

two pounds zinc paste, and one-quarter pound lampblack, breaking this mixture up in one pint good oil drier, adding one pint boiled linseed oil and two quarts turpentine, and finally one-half pint 90 per cent. benzol, which will produce one gallon of blueish gray stain. Alternate proportions of zinc paste and lampblack, according to depth of stain desired. The benzol will aid penetration, and color effect will not be changed materially by the shellac and varnish, if both are of pale variety.

We do not know of any stain, aniline or otherwise that would have in its composition benzol only for thinner, nor do we think that such a stain would be practical.

—471—

Finishing Birch in Imitation of Mahogany.

Wanted to know how black birch can be made to imitate mahogany finish.

Black birch is very useful in furniture making and interior wood work, as it takes on a fine polish, being closed grained. It will take any stain well, its natural color being similar to that of wild cherry, and it is usually stained. It makes a good imitation of either black walnut or mahogany. Feathered mahogany can be very closely imitated by a stain made from Bismarck brown and a trifle of drop black. It is not absolutely necessary to use a paste filler after staining, and two coats of shellac varnish will bring the surface up to a good level for polishing, after sandpapering. Yet some finishers prefer the use of a paste filler, properly colored, because, they claim, that this will help to bring out the details required for certain kinds of work.

—472—

Staining Mahogany Boat Decks.

Wanted to know if there is liable to be trouble, other than fading, when decks of boats that are of real mahogany are stained with water or acid stain, when properly filled and coated with varnish.

If the wood is thoroughly dry and properly dressed, we see no reason why water or acid stain cannot be used, especially after a good mineral filler. Some wood finishers find it of advantage, before filling real mahogany, to apply over the water stain a very thin coat of shellac varnish, as they find that by so doing the filler will hold up the succeeding coats of varnish much better than when the stain is followed directly by the filler. Water or acid stain has the advantage over oil and pigment stain in that it does not cloud the grain as much, and when the filler is well sanded before varnishing the method will produce good and lasting results, providing the varnish is of good quality.

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Finishing Furniture in Mahogany Effect.

To finish mahogany have the wood well sandpapered, then apply water stain made with water soluble Bismarck brown. Let this dry, then apply a thin coat of shellac varnish (made by dissolving two pounds gum shellac in one gallon of denatured or wood alcohol). This will lay the fibre and will not interfere with the filling of the grain. Go over it lightly with sandpaper when dry and hard, then give a coat of mahogany paste filler in the usual manner, allowing ample time for its hardening, when the surface should be sanded and dusted. This can be followed with a coat of shellac varnish of standard body and several coats of varnish or the shellac can be dispensed with. The quality of the varnish is determined by the price received for the work. If birch is to be imitated in mahogany effect, it is best to use an oil pigment stain prepared from high-grade burnt sienna in oil with enough rose pink or rose lake in oil to obtain the

desired richness of color thinned with a mixture of one part boiled linseed oil, one part japan drier and three parts turps. To give increased penetration add one part benzine to two parts of the stain immediately before use. When dry, sandpaper lightly and apply one or two coats shellac varnish and finish with good rubbing varnish.

—474—

Stain for Imitating Fumed Oak Effect on Fir and Spruce.

A Washington painter had a contract to finish several hundred dining tables of spruce and fir, mostly the latter, in fumed oak effect. He found it difficult to obtain the desired color and the nearest approach was had by using a water stain, which, however, raised the grain so badly that it was next to impossible to smooth it down again and the color was changed thereby. He wanted a formula for an oil stain or other material to produce the right color effect on the fir lumber.

It is difficult to work out a formula for such a stain because, in the first place, we have seen samples of genuine fumed oak and imitations of fumed oak by the dozen, no two of which were exactly alike, and in the second place we are not well acquainted with the nature of Washington spruce and fir lumber. The only suggestion we can make is to prepare an oil and turpentine or an oil and benzine stain by mixing dropblack in oil or lampblack in oil with burnt umber in oil or Vandyke brown in oil until the desired color effect on the particular wood you wish to stain is obtained, thinning the mixture of color with one part linseed oil, one part strong drier and four or five parts turpentine or turpentine substitute, or equal parts of pure turpentine and benzine to make up the five parts of volatile spirit. If the lumber is yellowish would suggest to use dropblack and burnt umber, if reddish, use lampblack and burnt umber. An addition of 10 per cent. by measure of coal-tar benzol to the stain will assist in penetration if the lumber is fairly sappy. Fumed oak finish, in the East, is generally waxed.

—475—

Fuming Oak by the Ammonia Process.

The only way we know of in which oak may be fumed uniformly when it is already in position in the interior of rooms is to take ammonia of the greatest strength, placing a number of shallow dishes filled with the liquid around the room, closing windows and doors, even stopping up keyholes in doors and all crevices. The ammonia most active is that of 26 deg. Be., and for a room sixteen by twenty feet one gallon is the least that is required, and the time of exposure to the ammonia fumes will be at least twelve hours to produce a dark enough coloring on the wood. By applying a weaker grade of ammonia to the wood by means of a mop at the end of a stick, it is asserted that the wood can also be colored to match the fumed effect, but we cannot vouch for this.

—476—

Imitating Black Ebony on Wood.

There are many ways to ebonize different woods, but the processes are mostly too tedious to be followed by an amateur, requiring too many different solutions and also certain apparatus for drying, etc. The following is about the simplest method we are aware of and may suit your purpose very well:—Boil two ounces of logwood chips with one and one-half ounces green copperas (sulphate of iron) in one quart water. Apply this solution hot to the wood by either dipping or brushing and allow the wood to dry. Dissolve two ounces steel filings in one-half pint strong vinegar and apply this to the wood in the same manner as the first solution, not necessarily hot, but warm. When dry, sandpaper the wood until quite smooth, then oil and fill with paste filler that has been colored with finely powdered drop black. Wipe off the surplus, as is done in filling furniture and

when dry give a light coat of pale quick drying rubbing varnish, then rub with fine pulverized pumice and linseed oil until smooth, clean off and polish lightly with rotten stone and sweet oil.

—477—

Gray Stain for Elm Wood in Show Windows.

Make a solution or wash of one part of nitrate of silver in fifty parts of water, all parts by weight, and apply this to the wood twice by means of a sponge, letting it dry after every application. Then wash it over with dilute hydrochloric acid and when dry go over it with ammonia water. When the wood has dried, finish with flatting varnish or with shellac varnish, in which case the work must be rubbed. Darken the windows while the stain is drying. Another gray stain may be made by boiling orchil paste, one pound in seven pints of water for thirty minutes, which is applied by means of a sponge, and before the wood is quite dry it is washed over with a solution of nitrate of iron of one degree Be. Must not be heavier or the stain will be yellowish instead of bluish gray.

—478—

Dyeing or Staining Wood.

Iron liquor is simply a solution of sulphate of iron (green copperas) in water and can be made in various strengths. The saturated solution is usually adopted for washing over woods.

Mordants for wood dyes consist of chemical preparations applied to fix the colors used in dyeing woods. Those most common in use for the purpose are solutions of iron sulphate, iron acetate, tin, alum, calcium chloride, barium chloride and magnesium sulphate.

French gray finish we have never heard of as a standard finish in architectural or ornamental woodwork, although French gray is a popular term for a warm gray tint in paint and is also used to designate certain grays in the textile branches of commerce. Manufacturers of house paints, when naming a gray tint as above, usually tint white with drop black instead of a lampblack, adding a trifle of light chrome yellow and a tinge of red, so as to give it a faint suspicion of lilac.

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Dyeing Veneers, Piano Keys, Etc., in Imitation of Ebony.

There may be more recent processes, but the following are said to give good and lasting results and are worth trying out in a practical way. For ebonizing piano keys try this method:—Make a saturated solution of alum; that is, dissolve as much alum in hot water as it will take up without precipitation. Keep this solution hot, but not boiling, and immerse the wood in this for forty-eight hours, then brush over the wood several times with a decoction made by boiling one part by weight of best logwood in ten parts by weight of water; filter through linen and then evaporate by gentle heat to one-half its volume. To each quart of this decoction add ten to fifteen drops of a completely neutral, saturated solution of indigo. After applying this dye to the wood rub the latter with a saturated and filtered solution of French verdigris in hot glacial acetic acid, repeating the operation until a black of the desired depth has been obtained. To give the keys a fine polish, apply two coats of best rubbing varnish, which, when hard enough, rub with fine pumice and crude oil, wipe clean and apply another coat of the same varnish, which rub with oil and rotten stone. Finally give a flowing coat of copal spirit varnish, and when this has dried hard rub with chamois skin to a very smooth polish. For this dyeing process it is best to use oak, as this wood will make the best imitation of ebony. For

veneers of beech, hollywood or pear tree wood a strong liquor should be made of either logwood or nut galls. The veneers are steeped in this liquor until thoroughly saturated, then taken out and permitted to dry. Next they are washed over with a solution of iron sulphate (green copperas) in water. When dry and not found dark enough, repeat the operation. Always wash with clean water after each application of the iron solution. When dry, apply rubbing varnish, rub and polish, as best suited.

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Mahogany Stain That Will Not Fade.

Use burnt Italian sienna, ground as fine as possible in linseed oil, beat up well, adding little by little a mixture of three parts of boiled linseed oil, three parts pure turpentine and one part of a good liquid drier or japan, until the stain is thin enough to run freely from stick or paddle. Apply this to the well sandpapered surface and let it dry thoroughly. If the wood is somewhat coarse grained use mahogany paste filler or natural paste filler, colored with dry burnt sienna, and finally finish with outside or spar varnish, which you can rub or moss down, if high luster is not desirable. If the sienna is fairly rich, you will have a fine permanent effect, but if you wish the color of old mahogany the addition of a little Vandyke brown will produce it. The present day mahogany stain put up by some manufacturers, who are catering to certain trade, contains, as a rule, fugitive aniline dyestuff, and this you do not want. The more permanent aniline color, Bismarck brown, so much used for many years in mahogany stain, is difficult to obtain, even at very high cost, at the present time.

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Staining Doors Where Oil Stain Has Partly Worn.

Sandpapering around the door knobs, you may succeed in making the oil stain hold on, but the stain must not be too oily in order to make it penetrate well into the wood. Oil finish usually indicates the effect on a surface coated with linseed oil paint. Hard oil finish is the term used in designating a good inside or furniture varnish.

—482—

Bleeding of Penetrating Wood Stains.

The bleeding of wood stains depends simply upon the selection of the coloring matter used in producing the stains and, to some extent also, on the volatile matter. If, for instance, earthy pigments, such as raw or burnt sienna, burnt umber, Vandyke brown or bone or vine black, form the base of the stain, there can be no bleeding, nor will there be any bleeding if alizarine red (the substitute of the madder root) or any other non-bleeding crimson or maroon lake forms all or part of the base. But when the ordinary soluble aniline colors are employed as the base for the stain there is always more or less bleeding, the degree of same depending upon their selection and the treatment of the wood after the stain has been applied. The pigment stains, of course, do not penetrate as deeply into the wood as do the aniline stains, because the pigments do not color the volatile thinness used in making the stain, while the soluble aniline colors impart much of their dyestuff to the vehicle, thus actually staining the wood fibre. These bleeding colors, even after the stain has dried, will give up some of their dye, when varnish or other material is placed over the surface, unless the stain is held down by an alcoholic solution of gum shellac as an intervening coat. The best penetrating stains are produced by dissolving the so-called fat aniline colors by moderate heat in linseed oil or varnish, reducing the solution with turpentine or benzine, as may be desired, and in the case of using the stain on sappy wood, the addition of 10 per cent. by measure of 90 per cent. coal-tar benzol will prove beneficial. The oil soluble fat aniline colors may be had in black, blue, brown, yellow, orange, light and dark red, and are fairly permanent.

—483—

Mahogany Oil and Water Stains.

Acids used in making acid stains, how can a good dark mahogany oil and acid stain be made, and the cheapest way?

Acids are not used in making oil stains, but dilute nitric acid or dilute sulphuric acid, as well as acetic acid (strong vinegar) is often used to mordant the wood, previous to applying water stains. There are very few colors that require dissolving in dilute acid, the modern water stains being made by using soluble aniline colors. For mahogany stain dissolve Bismarck brown in water that is boiling hot. Three quarts of water to one ounce of the powder is a good proportion. When the solution has cooled, strain through muslin, and it is ready for use, but must be free of sediment. Before applying the stain wash over the wood with a solution of one part nitric acid in four parts of water, protecting the hands with rubber gloves. When the wood has dried, apply the stain repeatedly until the desired effect is obtained. If a very dark mahogany is desired, the grain may be filled with a black paste filler after staining.

We cannot understand why you could not succeed in making an oil pigment stain strong or deep enough to imitate dark mahogany. By mixing Vandyke brown and rose pink or crimson lake, ground in oil, thinning the mixture with pure spirits of turpentine and adding sufficient drier, a penetrating stain of any depth and rich color can be obtained that will be much more permanent than aniline water stain. When oil stain of the above description is used, the nitric acid wash may be dispensed with, and if deep penetration of the stain is desired, the addition of 10 per cent. by measure of 90 per cent. coal-tar benzol will be beneficial.

—484—

Staining Cork Carpet.

Use a good chrome green of the proper shade, ground in linseed oil and reduce it to brushing consistency with, say four parts boiled linseed oil, 2 parts good brown japan, one part turpentine and one part benzole of 90 per cent. quality. If you find the material too heavy to penetrate well, reduce with more thinner made of equal volumes of turpentine and 90 per cent. benzole. When mopping the carpet do not use ammonia in the water, nor any soap, and have the cloth well wrung out.

—485—

Finishing Birch in Mahogany Effect.

Birch wood can be brought to an excellent mahogany finish, especially the black variety, which closely resembles cherry and is rather close-grained. It takes polish very well, but being rather light in color must be stained. It does not require a paste filler, but should have two coats of shellac varnish over the stain and then be sandpapered. For a high grade finish, two coats of rubbing varnish should be given, and these rubbed down, then a coat of finishing varnish which admits of polishing. Use rotten stone and olive oil for polishing and clean off with alcohol.

—486—

Natural or Stained Interior Wood Finish.

Finishing hardwood in a room, both in the natural or stained, from start to finish with a high polish effect. Also in white enamel finish:—

When the wood is of such close grain that filler is not required but must be stained, the stain must always be applied first and the surface sandpapered when stain is dry. Then the surface is dusted and one coat of shellac varnish applied—

white shellac for light wood and orange shellac for dark wood. The shellac coat should be lightly sandpapered and followed by at least two coats of interior rubbing varnish, which should be rubbed with pumice and water or at least mossed down with pumice and hair. When a good, smooth surface is thus obtained, which you can ascertain by passing the palm of your hand over it, clean off the whole surface and allow to dry well. Then apply a good flowing coat of polishing varnish, and after drying rub down with rotten stone and sweet oil. When the wood is open grained such as oak, if wanted in the natural, fill the grain with natural or light paste filler, but when stained, apply the stain first and then fill. Sand down the filler when dry and hard, then apply at least one coat of shellac varnish and proceed in the same manner as suggested above for wood that does not require filling. When the wood has been stained, the filler should also be stained to match the effect desired. To finish interior wood work in white enamel, prime with flat lead and build up the surface with a few coats of white ground, such as are offered by the manufacturer of the enamel white and follow directions as given. If rubbing and polishing is desired, use rotten stone and water and finally, rotten stone and sweet oil.

—487—

Creosote Oil and Dryers for Shingle Stains.

There are several sorts of creosotes on the market, some grades being more refined than others and therefore paler than the general run. They are classed as red and yellow, the latter being better adapted where the color of the stain is desired cleaner, but we would caution against the use of wood creosote, for the reason that this is apt to destroy the color, especially if it be chrome green. Coal-tar creosote is best, as it acts as a preservative for the shingles, especially when they are dipped before being laid. We would not advise using creosote only in the preparation of shingle stain, but a mixture of equal portions of creosote and 110 fire test kerosene. In order to keep the stain from settling or caking in the container we suggest the color to be ground fine in oil, using chemically pure chrome green, light, medium or dark, as desired, or if moss green is wanted use as a base also chemically pure chrome green, some raw Italian sienna, a small portion of lampblack and some zinc white, all ground in linseed oil. Beat up enough of this base with liquid drier to a smooth semi-paste and thin with the mixture of creosote and kerosene until thin enough to make the stain drain well from the shingle on dipping. If desired for giving shingles another coat after being laid, the stain may be made stouter. For a red stain the color base should also be ground fine in oil and in order to keep the stain from settling and caking unduly, the coloring matter, be it Indian red or red oxide of iron, should be as strong and as free from inert material as possible. Drier, of course, should also be used in the red stain, otherwise it is liable to be washed off by a driving rainstorm before it has had sufficient time to penetrate into the wood.

—488—

Gumwood to Finish in Circassian Walnut.

Gumwood, having a fine grain, does not require filling, although it does no harm to use a thin coat of paste filler, especially when a high polish is desired. It is best if left in the natural or with only a light coat of stain. As to this it depends very much on the natural color of the wood, as it had in very light or white, black or bluish and red. The red gum is preferred for staining in imitation of Circassian walnut and the white or light gum is often called satinwood. The process of finishing any gumwood in the natural is simply to fill with paste filler, when so desired, then varnish as in the case of oak, until the effect is attained. Rub each coat or use flattening varnish and finally polish in the usual manner. As to the stain for the imitation of Circassian walnut effect, we cannot give a standard formula, because we have not seen two pieces of the wood alike in color.

—489—

Silver Gray Shingle Stain.

Beat up twenty pounds pure American zinc white, which is ground in pale linseed oil, with one quart pale liquid drier, until free of lumps, then add another quart of the same pale drier, and tint this with a trifle of lampblack in oil, until you have the shade of gray you prefer. Then, if you wish the creosote odor in the stain, do not use ordinary creosote, but stir in one-half yellow cresylic acid (straw colored) which will not discolor your light gray tint and will act as a preservative to the shingles the same as creosote. Thin the mass down with eight gallons painters' naphtha (petroleum benzine of 58 deg., not gasoline). If you wish to, you can omit the cresylic acid.

—490—

Ready-Made Mahogany Stains Losing Color.

A writer has had some bad results with ready-mixed mahogany stains called penetrating oil stains. He says that when sometimes he applies a rich dark mahogany stain and applies it to the wood, then fills with paste filler he finds that in wiping off the excess of filler the color of the stain comes off with it, making too light an effect on finishing.

It makes all the difference in the world what kind of wood you apply the stain to. Soft, porous woods will hold the stain, but wood like birch, chestnut, cedar, etc., also Southern pine, are either sappy or oily, and in this case the addition of 10 to 15 per cent. of benzol will give better penetration. The addition of a small portion of coach japan will assist in holding down the color used in the stain, which, if very rich and dark, is made with basic coal-tar color, such as rose pink, and this will readily bleed out after filler is applied unless it is fixed securely in the wood. Therefore you must see that your stain has dried in firmly before applying the filler, and the filler should be thinned with pure turpentine instead of benzine or turpentine substitute, because rose pink is very apt to bleed otherwise, and to make the stain from non-bleeding color is out of the question on account of cost at this time.

—491—

Staining Over Old Painted or Varnished Floors.

For some years past, paint and varnish manufacturers have put up materials for this very purpose by recommending ground color and varnish stains, that, since rugs are in fashion in place of carpets, are in great favor by housekeepers, since the varnish stains are wanted for coating the spaces of floors not entirely covered by the rugs. As some of the floors are unsightly or the occupants desire to change the color of the stains from one to another, the only way possible is to put one or more coats of the ground color on those spaces, and when the ground color has become sufficiently dry and hard, the varnish stain is spread over it, making a good finish, so long as the varnish is of the right quality.

The ground color should consist of a good inside paint, made of white lead, zinc and inert pigment, such as silex or silica ground in linseed oil, thinned with part turpentine and enough japan drier to dry with eggshell gloss inside of 10 or 12 hours, tinted to a strong buff with yellow ocher and a trifle of red oxide.

The varnish stains are best made from colors ground in linseed oil, usually 1 to 1½ pounds to a gallon of hard drying floor varnish, which should of itself dry in from 10 to 12 hours. Use only strictly pure colors, or you will have trouble in settling and caking of the stain. For light oak select raw Italian sienna. For dark oak choose raw Italian sienna and a trifle burnt Turkey umber. For cherry use burnt Italian sienna and a trifle raw sienna. For mahogany, rose pink and burnt Italian sienna. For walnut use burnt Turkey umber. Mix well with the varnish and stain before using.

—492—

Staining White Pine to Imitate Cherry or Oak.

To stain soft or white pine to look like the natural cherry or oak is next to impossible, as in either case the grain will be always that of pine. We have seen some such effects in very cheap inside woodwork, where the cherry imitation was done with stain made of Venetian red and ocher, and the oak imitation done with a stain made of raw sienna and a trifle umber, the pigment being ground in oil, some drier added and the thinner one-half linseed oil and one-half benzine.

The effect was simply a smear, as the grain was lacking in either case. However, if the parties insist on having you do the work, without resorting to graining, the best you can do is to make a stain from dragon's blood, dissolved in either wood spirit or denatured alcohol of 188 degrees. When the gum has been dissolved, thin it down with more alcohol, until you obtain the desired color for cherry wood. As dragon's blood is a gum, you will not require shellac varnish, which at any rate is very high in price. A stain so made will not darken the wood, as would a stain made with oil.

To stain the wood the color of dark oak, use orange shellac, dissolved in wood spirit or denatured alcohol of 188 degrees and add a trifle asphaltum varnish, or, still better, in order to avoid streaks, dissolve the asphaltum gum in some of the spirit. If the first coat does not give a smooth surface, wait until it has become hard enough and rub it down lightly with steel wool, dust well, and apply another coat, somewhat thinner than the first. If you want to imitate the color of light oak, omit the addition of asphaltum, using straight orange shellac varnish only.

—493—

Staining Red Brick the Color of Brown Stone.

To make a good job of this you must not consider the cost of labor too costly, or you had best not attempt to undertake it. Rub down the old as well as the new portions of the walls, using brick for a rubber, keeping the surface well wet while doing this, using for the purpose a wash made of Portland cement stirred in water until it has the color of cement. Color this wash with a little dry Venetian red and lampblack or mineral black, until it looks brownish. This treatment will make the old surface flat and fill the pores of the brick in the new portion. Let the surface dry and brush it over with a stiff brush or broom of fiber. Make your stain by mixing Venetian red ocher, ground stiff in linseed oil, and add enough lampblack to obtain desired shade. Thin this color down to the right consistency with one part japan drier and three parts spirits of turpentine. Do not use petroleum spirits for this work.

—494—

Finishing White Birch to Resemble Mahogany.

State how to mix a stain and filler with which white birch can be made to resemble mahogany on low-priced funeral caskets. What is shellac varnish colored with to make a darker stain on birch and also on real mahogany? The caskets I have reference to are finished in a cheap way, first stained then filled, shellac varnished, rubbed and finally polished. What are oil of hemlock and oil of cedar used for? Will venetian red, linseed oil and drier make the proper stain for birch and will I need to wipe over the stain? Can the dark mahogany color be produced by mixing orange shellac spirit varnish with Bismarck brown or will Vandyke brown do? What makes a real good mahogany stain?

It is a question as to what effect should be brought out in imitating mahogany by staining birch, but you cannot even approach anything resembling the real color in any of its various shades by a stain made from Venetian red, because this

would look too much like a solid paint and entirely too dull. Since paint and varnish manufacturers have introduced lines of oil stains and varnish stains for householders' and woodworkers' use in ready-for-use forms, the effect of natural mahogany finish has been lost, because there has been a tendency to cater to the taste of the users by enriching the stain to a brightness which is not to be found in the natural finish. Natural mahogany comes in a dozen or more varieties of color, some being almost whitish, others of the color of light cherry, others deeper and some almost brownish. Birch is easily stained for a mahogany effect and can be treated with or without filler. Piano case makers usually stain either birch or natural mahogany with a stain made of Bismarck brown, dissolved in spirits or water, and fill with a filler made of Vandyke brown or drop black, ground fine in oil with some very fine silex, thinned for spreading with turpentine. This filler produces the effect of the grain in natural mahogany. The stain is lightly wiped and the filler, sanded after having dried with steel wool, followed by two coats of shellac, which are sanded down, will bring the surface to the proper condition for polishing. If you prefer an oil stain to spirit or water stain, we would suggest to make it by mixing burnt Italian sienna, ground fine in oil, thinning it with a portion of japan drier and enough turpentine to make it work well. If not rich enough to meet your view, add a small portion of rose pink, ground in oil. If you use shellac varnish over this you can dispense with paste filler, the shellac taking its place.

—495—

Golden Oak Oil Stain for Fir Doors and Casings.

Mix two pounds raw Italian sienna and one pound burnt Turkey umber ground in oil and thin with one-half gallon boiled linseed oil and one pint each of japan drier and turpentine. If not dark enough to suit your idea, reduce the coloring matter and add enough asphaltum varnish to make a gallon of stain.

VARNISH AND VARNISHING.

—496—

What Is Shellac Varnish?

Shellac varnish, in order to be the pure article, must not consist of anything but pure gum shellac, bleached, orange or ruby, cut with grain alcohol, wood alcohol, methylated spirit or denatured alcohol. Chemicals are not used in its manufacture, but sometimes it is adulterated with rosin.

—497—

Comparative Wearing Qualities of Shellac Varnish Made with Different Solvents.

An opinion was desired as to the relative wearing qualities of shellac when dissolved in pure grain alcohol, in denatured alcohol or in a high grade of wood alcohol, providing that the same quality and weight of gum is used in the same volume of either of the solvents named. Is there anything in any one of these solvents that would impair the wearing qualities of the varnish produced?

This question is a rather difficult one to answer, as very much depends upon the purity of the solvents. In the opinion of experts there is no perceptible difference in the wearing quality of the varnish produced from the same batch of gum, no matter which of the three solvents is used, so long as each is of high grade, that is, free from admixture with solvents of another nature. The principal difference is noted in their odor and working properties. Shellac varnish prepared by the use of pure grain alcohol has a rather pleasing odor, and does not affect the eyes of the operator. It works much more freely and sets more slowly, but dries and hardens more rapidly than will the varnish made from the same gum in similar proportions with the very highest grade of wood alcohol. The latter, on the other hand, does not work so freely under the brush and cannot be manipulated as well, because it sets much more rapidly, without, however, drying or hardening in as short a space of time. In closed shops it is very apt to affect the eyes of the operator, and has even produced permanent blindness in some cases when the fumes were inhaled. In the French process of polishing it cannot be used at all, being too apt to drag. Denatured alcohol shellac varnish, which contains not over 10 per cent. of wood alcohol and no other substance to make it undrinkable, comes very close to grain alcohol shellac in its general characteristics, but is not fully up to it.

—498—

To Prepare Shellac Varnish.

What is the best method to cut or dissolve white gum shellac in a small way for use as a spirit varnish? The inquirer bought three ounces from a druggist and placed it in a fruit jar with one pint of grain alcohol, keeping the jar in a pail of hot water, stirring frequently for nearly a day. The shellac, which was in lump form, soon looked like a lump of wet corn meal, very little of it having been dissolved, while the alcohol assumed a milky opalescence, and on being exposed to the air proved to be without any adhesive quality or body. Was the trouble in the shellac or in the manner of dissolving?

Your failure may be due to either of two causes: the white gum shellac you purchased may not have been kept properly, and on that account lost its cohesive property, or your alcohol may not have been of the proper strength to cut shellac. The alcohol should be 95 per cent., or, at any rate, not less than 90 per cent., in strength. But, at any rate, you did not go about dissolving your shellac in the proper way. Placing the jar in a hot-water bath was all right, but

you should have crushed the gum to a fine powder before placing it in the jar with the spirit. To do this properly put the gum into a strong bag and beat it with a hammer or mallet until it is crushed into powder, then sift out the fine powder and beat the coarser particles until all is fine. It requires four ounces white gum shellac to one pint of alcohol for varnish of good consistency.

It depends upon the quality of the gum as to how much is required. When a good grade of orange shellac, like D. C. or V. S. O., is used, one and one-half pounds of this material dissolved in five and one-half pounds 95 per cent. grain alcohol will produce one gallon of shellac varnish of good body. Of brown button lac, which is heavier and usually contains some impurity, two pounds will be found necessary for the same quantity of alcohol. For white shellac varnish of good body two pounds of bleached shellac in granulated form and three quarts of 95 per cent. alcohol are required. These varnishes may be reduced by the addition of more alcohol, so as to suit the requirements for hard or soft, close or open grained woods.

—499—

Cutting Gum Shellac in Alcohol.

To cut any kind of shellac in quantity and in the shortest possible time and most economical way is to take a steel drum, that is enameled inside and has a manhead in center with screw cap and an outlet near bottom in one end, where a cock may be inserted. Or in place of this drum a tight wooden cask of the size desired with a large bung-hole may be used. Either should be so arranged to a revolving shaft that a tumbling motion of the drum or cask is had when the machinery is in motion. In other words, the ends or heads of drum or cask are alternately raised and lowered. As the shaft must revolve rather slowly, not over twenty revolutions per minute, the cost for power will be comparatively low. The process is a simple one, the gum and spirit being placed in the man-hole or bung-hole and, solution being completed, the resulting product may be drawn from the cock or spigot at end, strained and put into containers. It must be remembered that any kind of shellac varnish will discolor when kept in metal packages for any length of time. Very little precaution is needed in the dissolving of orange or brown shellac, but in the case of bleached or white shellac, it is best to purchase it in hunks, bruising it and taking care that the alcohol is not denatured by the use of discolored material, but that it is perfectly colorless. Since denatured alcohol has come upon the market, it would be folly to pay the tax upon pure spirits of wine, or grain alcohol, known to the drug trade as cologne spirit or deodorized alcohol. Denatured grain spirits will produce the best commercial article, Columbian spirit (pure methyl alcohol) and wood alcohol being also used as solvents for gum shellac. In order to make shellac varnish flow more freely from the brush, a moderate portion of true Venice turpentine, the grade known as clear, is added, while dissolving the gum, and this need not be considered adulteration, as the cost of this is about equal to the price of medium grades of gum shellac. Especially when wood alcohol is employed as the solvent, the addition of Venice turpentine is beneficial, although very often ordinary rosin is used as a cheapener.

In cutting bleached shellac with denatured alcohol or Columbian spirit, we would suggest the range of proportions as from thirty to forty parts by weight of the solvent to ten parts of gum, and when wood alcohol is used, the solvent should be not over thirty to thirty-five parts, according to the consistency desired. The addition of Venice turpentine should not exceed 10 per cent. of the weight of the gum in any case. Similar proportions hold good in the cutting of orange, ruby, garnet or brown shellac, but the cleaner gums will carry more solvent than the inferior grades.

—500—

Deterioration of White Gum Shellac in the Dry State.

Why does white shellac, powdered or granulated, deteriorate on keeping it in stock for a time? What is the reason that when in that state it is not readily soluble in alcohol, but remains ropy or stringy? Is there any remedy?

There are various methods for bleaching shellac or seedlac to white. The most common method or process is accomplished by treating the lac with chloride of lime, bleaching powder or chlorine gas. One way to bleach orange shellac white is to rub up with and dissolve in one quart of water two pounds chloride of lime. To this add four ounces caustic potash dissolved in one pint of water. Digest in one gallon of alcohol two pounds shellac for a few days, then add the solution of chloride of lime and caustic potash, with constant stirring, to the alcoholic solution of shellac, and after thirty minutes add an excess of hydrochloric acid, which will precipitate the shellac. Now pour off the fluid and wash the precipitate of shellac with boiling water until it comes off clear; place it on moist boards and dry.

The deterioration of bleached or white shellac is due to the attack of the chloride, especially when the washing has not been done thoroughly or all of the chloride of lime has not been removed by the addition of hydrochloric acid. Especially in the granulated form decomposition from the causes named sets in at an early stage and renders the material insoluble, hence useless, and there is no remedy. To prevent this, white or bleached shellac should be bought in the hunk or twist form and kept under water, changing the water quite frequently and washing off any scum that may have collected on the hunks. A still better way is to keep the hunks in a barrel on a crate, below which is water, that must not, however, touch the shellac, and the barrel should be covered with sack-cloth or coarse burlap. In this way it will keep much longer without losing its solubility in alcohol.

—501—

To Prevent Shellac Varnish from Darkening and to Restore Its Color.

A good grade of shellac varnish does not turn dark, when kept in glass bottles, while it will usually do so in tin cans, especially when the shellac is dissolved in wood alcohol. The color may be restored by adding a trifle of oxalic acid. The usual amount is one-quarter of an ounce to a gallon of shellac varnish, which is frequently agitated, until the original color is restored. We do not know of any other treatment.

The addition of one tablespoonful of oxalic acid to the gallon of shellac varnish at the time of cutting will effectually prevent its blackening.

The following comes from D. L. Paulus, formerly foreman painter of the Barney & Smith Car Company, Dayton, O.:—For the benefit of brother craftsmen, to whom it may be of assistance, will say that orange shellac varnish, that has blackened in tin cans, can be readily restored to its original color by adding two tablespoonfuls of oxalic acid to the gallon of the shellac, when it will clear out at once.

—502—

Cure for Shellac Turning White.

Henneman & Johnson, of Portland, Ore., inform us that they have accidentally discovered a very simple remedy for shellac turning white by reason of dampness. A natural finished job that had been oiled, puttied and received a coat of shellac turned white from dampness. A lighted cigar was accidentally

held near the woodwork, when it was found that a spot the size of a dollar had turned the natural color again, by reason of the heat. They took a gasoline torch and simply warmed the woodwork with the blue flame, when, as if by magic, it turned the natural color again, and no time was lost getting a good coat of varnish upon it. The cost was much cheaper than any other remedy they knew of.

—503—

To Render Damar Varnish Clear and Transparent.

To remove the opalescence from damar varnish add to one gallon of the varnish one pint of best grain alcohol or denatured alcohol. Stir vigorously, then set away to rest over night. If this addition of alcohol should keep the varnish from flowing out easily, add one-half pound clear Venice turpentine to the gallon of varnish.

—504—

Spirit Varnish from Gum Sandarac.

Gum sandarac is a soft, brittle rosin which, when chewed, does not adhere to the teeth, like gum mastic, but breaks up in powder. It is insoluble in petroleum ether or benzine, partly soluble in turpentine and coal tar benzol, but perfectly soluble in 95 per cent. alcohol, be it wood or grain spirit. In order to produce sandarac spirit varnish cheaply use denatured alcohol as the solvent. Dissolve one part by weight of the gum in two parts of the solvent.

—505—

French Varnish in Various Colors.

French varnish is a spirit varnish, prepared by dissolving two parts bleached or orange shellac in ten parts by weight of 95 per cent. alcohol, using pulverized glass to clarify the solution through agitation with glass, and finally allowing the mixture to settle, using the clear solution only. To color the varnish, vegetable or aniline colors that are soluble in alcohol are employed.

For red use one part by weight of rosin to forty-nine parts by weight of the bleached shellac solution.

For blue use one part by weight of aniline blue to twenty-four parts by weight of the bleached shellac solution, as the orange shellac solution would impart a greenish cast.

For green use one part of aniline green (brilliant green) to forty-nine parts of the orange shellac solution.

For yellow use either two parts by weight of extract of curcuma to ten parts orange shellac solution, or one part of gamboge to twenty-four parts of the solution, or one part aniline yellow to forty-nine parts of the solution.

For gold use two parts gamboge and one part best dragon's blood by weight to forty-seven parts by weight of the orange shellac solution. The gamboge and dragon's blood should be dissolved first in a little alcohol.

—506—

Pale Spirit Varnish for Retouching Oil Paintings.

A formula was wanted for preparing a good pale spirit varnish that is to be used on oil paintings to make them uniformly brilliant without flat patches. The so-called retoucher sold by dealers cracks very badly.

You may use gum sandarac or gum mastic, the latter, of course, being very high priced, for which reason it is not used in the retouching spirit varnishes sold by dealers, and very often water-white rosin is employed to cheapen the material, which accounts for their tendency to crack.

Sandarac spirit varnish is prepared as follows:—Four parts by weight of selected pale gum sandarac are finely pulverized and placed in a suitable enameled kettle or a glass jar with fourteen parts by weight of 95 per cent. grain alcohol and four parts of clear Venice turpentine and stirred with a glass rod over a moderate sand bath. When a complete solution is effected the varnish is filtered through filter cloth or paper, allowed to cool and set aside well corked in a glass bottle.

Mastic spirit varnish is prepared in the same manner, but five parts by weight of gum mastic and two parts by weight of clear Venice turpentine are used with fourteen parts by weight of 95 per cent. alcohol. The residue from gum mastic, when dissolving it in alcohol, the so-called masticin, may be dissolved in turpentine and need not go to waste.

If it be desired to have these varnishes dry more rapidly it is best to cut down the proportion of Venice turpentine to one-half, or even less. To make these varnishes absolutely clear and almost colorless it is best to add one-tenth of its weight of powdered glass, shaking frequently, and allow to settle, when the clear solution is decanted for use. Or the powdered glass may be stirred into the hot solution and clarified by filtration through carded cotton or asbestos fiber placed in a funnel. But to prevent loss the funnel must not only fit well into the bottle but must be tightly covered on top.

—507—

Varnish for Musical Instruments.

What constitutes the best varnish for finishing musical instruments, such as violins, guitars, mandolins, etc.?

The Italian method of making varnish for this purpose is said to be as follows:—Six ounces of gum sandarac, three ounces of gum mastic, one-half gallon of spirits of wine (grain alcohol) and one-half pint of turpentine copal varnish, pale, are placed in a tin can, set in a pot of hot water and frequently stirred until gums are dissolved, then the resulting product is strained and bottled for use. If too thick to work freely add a little turpentine. The wood should be stained before applying the varnish.

A good spirit varnish may be made by dissolving one ounce gum sandarac, one ounce gum mastic, six and one-half ounces gum lac in twenty-four fluid ounces of spirits of wine, straining it when dissolved. To color yellow use gamboge, for red use dragon's blood.

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Varnish for Musical Instruments.

Dissolve over a slow fire six ounces of sandarac resin, one ounce of shellac, one ounce of mastic and one-half ounce of gum elemie in twelve and one-half parts of highly rectified spirits of wine. Boil up the mixture in a water-lined vessel and then add one ounce of Venice turpentine. *H. C. Standage.*

—509—

Bluing of Varnish on Mahogany Furniture.

Soft copal, mastic and sandarac resins are apt to "bloom" or chill (i. e., form a milky or bluish opalescence) if applied on damp wood, (b) in damp air, (c) in a draught, or (d) in a temperature below 50 degrees F. The "bloom" is due to the resins becoming precipitated from the solvent in such fine particles as to produce the opalescence. The remedy consists in causing the solvent fluid to reabsorb the precipitated resin. This may be done by soaking cotton wool in hot alcohol, and applying it to the mahogany furniture (for flat surfaces, strips of clean blotting paper may be soaked in the spirit), and repeating the application until the blue disappears. The operation should be done in a temperature not lower than 70 degrees F. *H. C. Standage.*

—510—

Gum Used in Varnish Making and Clarifying Varnishes.

Zanzibar copal is the hardest of all varnish gums, and is also known as gooseskin copal, because the surface of the pieces resembles the skin of a plucked goose. It is found on the eastern coast of Africa, where it is cleaned by washing and exported to Europe and the United States, mostly by way of the East Indies, hence it is also known as East Indian or Bombay copal. It requires a temperature of about 540 degrees F. to melt it and the best grades are of pale color with a semi-gloss fracture, while those of less value show more of a reddish umber color.

Kauri copal is the next hardest grade of varnish gum, and for the past twenty years it has been most largely employed in the manufacture of hard-drying varnishes. It is found in New Zealand and New Caledonia and is a fossil resin, of recent origin, varying very much in color, mostly brown, but some nearly white, gray and yellow. The vapors, or melting, are decidedly aromatic and penetrating and, when dry distilled, the gum gives up a liquid, known as copal oil. It requires 600 to 650 degrees F. to properly melt this gum, and varnishes prepared from it are very hard and durable.

Amber or amber colophony is the most valuable of all varnish gums, so far as hardness and resistance to water comes into question, but varnish manufactured from this fossil resin can only be very dark, of a red-brown color, and on this account is valuable only for some few special purposes. It requires over 600 degrees F. of heat to melt it and during the operation emits ill-smelling vapors of succinic acid. It is most frequently found on the shores of the North Sea and the Baltic Sea, where it is partly dug up and partly thrown up by the sea. The amber that is used in the manufacture of varnish is mostly that portion of the raw material that cannot be used in the manufacture of mouthpieces for pipes, cigar-holders and other articles of luxury.

Fourth in order is Manila copal, or gum, which is not as hard as Kauri copal and melts at a lower temperature, at about 430 degrees F. In melting it gives up about 10 per cent. moisture and at least 8 per cent. of a dark oil of thick consistence and disagreeable, penetrating odor. If this oil is not fully removed the varnish made from this gum retains many annoying features. While Manila varnishes are far superior to ordinary rosin varnishes, they cannot hold a candle for comparison with those made from the gums previously mentioned.

Gum damar should really be classed among the resins, it being simply the exudation from the tree, known under the botanical name *Dammara orientalis*, which is native to the East Indies and the Sunda Islands. It is collected pretty much like the crude turpentine from the pine tree and the resin is only a trifle harder than our pine tree rosin. It is readily made liquid at 212 degrees F. and dissolves, when agitated in cold spirits of turpentine, but makes a clearer solution when heated with the turpentine, which is the only proper solvent.

Sandarac or Piney gum is nearly as hard as Kauri gum and is soluble in cold absolute alcohol and in ether; a very good material for spirit varnish. Varnishes are clarified by settling in tanks and subsequent filter pressing.

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China Wood Oil in Varnish.

As its name implies, China wood oil comes from China and is the product of the tung tree, from which it was or is sometimes called tung oil. The fruit of this tree is a peculiar bottle-shaped nut, somewhat poisonous in character, and when ripe the nuts are collected and the seed expressed, the result being an oil with the peculiar odor of ham fat, which odor is very difficult to remove or disguise. As an article of commerce it is of comparatively recent date in this country, although it has been known to Western scientists for at least thirty years, attempts having been made to plant the trees in Southern France and

Algiers, which, however, signally failed. It is said that the Chinese and Japanese have known the valuable properties of the oil for centuries and used it in preserving their boats. The peculiarities of the oil are that when used in the raw state it oxidizes rapidly and dries with an opaque film, and it required some years before the varnish makers of Europe and America understood its treatment. Large sums of money were wasted in this connection because the oil, when only slightly heated over a certain degree of temperature, invariably gelatinized into a useless mass. It is difficult to describe the proper treatment of China wood oil. The practical varnish maker only by careful study can obtain the right knack of treating it. In answer to your question, we will say that the usual process is a combine, say 50 parts by weight of hardened rosin with 450 parts of China wood oil and the usual quantity of drying mediums at a temperature of not over 280 degrees F., thinning the fused mass with spirits of turpentine. A certain quantity of this China wood oil varnish is added to ordinary linseed oil and rosin varnish in such portion as suits the needs of the case, but it does not exceed 20 per cent. of the total quantity in any case. When properly manipulated the varnish so treated becomes more tough and elastic and resembles varnishes formerly made from hard gums in that respect. Herein lies the value of the introduction of China wood oil.

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Petroleum Products as Solvents for Varnish.

An architect inquired: Should, in your opinion, a petroleum product, such as benzine, be found in high grade varnishes? What effect has its presence upon the working qualities and wearing qualities of the varnish?

For ordinary work, especially for interior work, where the varnished surface is not exposed to atmospherical conditions, and where odor does not cut any figure or where fire risks are not considered, we see no reason why benzine should not replace spirits of turpentine as a solvent or medium for varnish. Benzine varnishes, unless they contain a good portion of oil, do not flow as freely from the brush as turpentine varnishes, but as to the wearing qualities, much depends upon the nature of the resin or gum and upon the percentage of linseed oil which they are composed of. The wearing of varnish depends entirely upon the hardness of the gum or resin it is composed of and the proportion of oil in its makeup, for when varnish gums are made up into varnish with a volatile thinner alone and exposed in a thin film to the rays of the sun, such varnish will stand as long as the sun and weather would take to wither the gum alone, if it were exposed to the weather in as thin a film or layer under similar conditions. When oil is present it will prolong the life of varnish as long as the oil has not resinified to the perishing condition. Ordinary pine tree rosin is the first to perish or crumble into powder under the influence of the atmosphere, the softer copal resins follow next and the hard copals are most resisting, while fossil resin, such as amber or amber colophony, will resist moisture best. Varnishes with spirits of turpentine flow out more freely and evenly and are more resistant, all other things being equal, than those made with benzine, because the latter does not contain as much binding properties as spirits of turpentine and evaporates more quickly. The reputable varnish maker will fight shy of the use of benzine in high grade varnishes, as specifications usually prohibit its presence.

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Experience in the Use of Rubbing Varnish.

• Quite a good deal of experience and good judgment in the selection of the material is required to do a good job of rubbing. Practice is the best teacher here as in most other things. Rubbing varnish should always be of the very best quality, made from hard gum, and be free from rosin. It should not be too fresh or green, as varnish makers would say.

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Varnish Losing Luster.

A painter sent us the following question:—For the past ten or twenty years we have used the interior finish and floor finish of a well-known firm of varnish manufacturers. Up to within two years we have been well pleased with the results obtained from these varnishes, but since then we have noticed that, while the material still dries well and hard with good gloss, in a very short time the surfaces finished with the same lose their luster and assume a matt effect, as if the surface had been rubbed over with oil or grease. Can you give us an idea as to the cause?

If you are certain of your ground in this matter, then the logical conclusion would be that the finishes in question are composed of inferior material to what was used in their manufacture up to two years ago, which, in view of the great advance in the price of gums and turpentine, would not be at all surprising. Competition is keen, and unless you pay a much higher price for the goods than you did two or three years ago you can rest assured that you are not getting the same quality that you were getting before that time. Paint and varnish manufacturers, as a rule, have not advanced the price of their goods in the same ratio that their materials, labor, etc., have gone up, hence there must have been some way to introduce cheaper material. This is not necessarily fraudulent if the consumer still gets his money's worth. It would be no more than natural if the firm in question has substituted some less costly gum with more drier to harden it and some turpentine substitute in place of the real thing. Less gum, more oil, more drier and turpentine substitute would bring about the defect you mention.

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Preventing the Finish on Hard Woods from Clouding or Blooming.

What will prevent cherry, mahogany and walnut having that cloudy, dull or blue effect after being rubbed and polished? Also what would we recommend to be used for the three woods named for rubbing and polishing to obtain a clear effect?

In the first place, it is necessary that the surface is well finished and free from dust, etc., that the filler is well selected and stained with transparent color and when dry thoroughly sandpapered and dusted. The rubbing varnish must be clear and the brush of the utmost cleanliness, and the varnishing done in a dry room with good ventilation. Before beginning the rubbing, the varnish must be thoroughly hard, and the next coat of varnish must not be applied for twelve hours after the rubbing is accomplished. Great care is required in cleaning off after rubbing, and the rubbed surface must not be touched with the hands, a bad custom practiced by many. The finishing varnish must be as clear as possible and the work protected from moisture during the drying of the finishing coats of varnish. For rubbing we would recommend the use of ground pumice and rubbing oil or water, but when oil is used for rubbing it should be immediately removed when the operation is finished, as the rubbing oil tends to soften the varnish if allowed to remain too long. Clean off with soft wood sawdust slightly dampened and soft cotton wadding. When the surface is to be polished this cannot be done too carefully. To polish, apply over the rubbed surface a coat of finishing varnish, flow on carefully and rub when dry with finest pumice, clean up, then rub rotten stone over the surface with chamois skin moistened with water, in a circular motion. The rotten stone is to dry during the operation, and is removed with the palm of the hand, which is also kept in circular motion. Every time the hand has been passed over the surface it must be wiped on a cloth, held in the other hand. A shorter way of polishing is to dip raw cotton into a mixture of equal parts of sweet oil and grain alcohol, rubbing with a rotary motion until the desired effect is obtained.

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Bluing of Varnish on Mahogany Furniture.

An inquirer wrote:—I have a set of very fine mahogany furniture that was thought to be of the very best finish. The house the furniture is in is closed during the winter. The finish has turned blue, at least when looking across it it looks as if it was under the varnish. Could it be possible that the under coat or coats are shellac varnish and that it has turned white? We were asked to suggest some way to bring it back to its natural color without removing the varnish and refinishing the furniture.

Unless the trouble is due to inferior stain used to enhance the brilliancy of the wood, the cause is due to blooming, which happens to varnished surfaces when they are exposed to moisture or cold and damp atmosphere, as would be the case with your furniture when shut up in a cold house all winter. Blooming may be described as a whitish, metallic-like film, like the bloom on plums on a dewy morning, that appears on varnish and obscures its brilliancy. Some call it smoky or cloudy. You may try to give the furniture a thorough washing and dry it with a chamois skin. If this will not restore it to its former luster, you will have to rub it down with pumice and water, clean off thoroughly, permit it to dry well and revarnish the furniture.

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Cause of Blooming of Varnish and Remedy.

What is the cause that brings about the blooming of varnish and also a remedy for removing the same? The inquirer had tried, on the same job, over grained work and on hardwood (natural finish) high grade varnish from three different makers, and every one of these have a sort of mist over the surface and look very dull.

All authorities on varnish agree that the term "blooming" indicates a condition of a varnished surface similar to the dew on a ripe plum in the early morning. It is, as you say, a sort of mist and very annoying to the painter, as usually another coat of varnish is required to make the job good. The cause of the trouble may be found chiefly in local conditions and should not be blamed on the varnish. When moisture condenses on wet varnish, blooming is invariably the result. In most cases washing with clear water and a sponge and rubbing with a chamois skin will remedy the trouble if good ventilation is provided on a dry day, together with sunlight, if possible. Too much stress cannot be laid on proper ventilation for the drying of varnish. A warm room alone without dry air will not make varnish dry properly, and rapid changes of temperature and gas fumes at the time of application will also result in blooming. Should the washing and rubbing with the chamois skin fail to give you the desired result, then you can do no better than to lightly moss down the surface, clean up, allow to become dry and apply another coat of varnish, taking good care to do it on a dry day and give plenty of ventilation.

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Crawling or Creeping of Interior Varnish.

Is there anything to stop the creeping of varnish aside from rubbing it down? Early in the fall some work was being done in a church, varnishing the panels in the ceiling, new wood. It crept only on one panel and showed the creeping feature but little on the second coat, not at all the first coat, but on the third coat it crawled all over. It could not have been due to the weather, as it was not yet cold enough.

If the varnish crept on one panel and if that panel was coated at the same time as the others and the varnish from the same package, the trouble was not

due to the quality of the varnish and must have been brought about by some defect in the wood out of which that panel was made, or there may have been an unnoticeable leak in the roof that kept the wood damp, for it stands to reason that the creeping of the second coat was due to the first coat of varnish not having dried as hard as that on the other panels. The first coat not having thoroughly dried, the second coat kept soft and the third coat was bound to crawl, as it did. The varnish may be ever so good in quality and fall weather may not be considered cold enough to chill varnish; it is best, if varnish has become too thick for first coating raw wood, that it should be made to flow out by thinning it with pure spirits of turpentine, but only for first coat. The best preventive of creeping is to see that each coat of varnish is dry and hard before another coat is applied, but when it does show a tendency to creep through the sweating out, going over the surface with a moist chamois will stop it in most cases without going to the trouble of rubbing with pumice and water. An ounce of prevention, however, is worth a pound of cure in everything.

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Preventing Varnish Turning White in a Stable.

A stable, whose sides and ceiling are lined with North Carolina pine boards, was done in the fall, the woodwork being finished with one coat filler and two coats high grade interior finish, but the stable being rather damp, this and the ammonia fumes soon whitened the varnish. On discovering this the surface was coated with the very best spar varnish, but it turned white, too.

If a good grade of varnish has gone as you describe, then the trouble is caused by poor ventilation, and the only remedy is to see that the conditions causing the dampness are removed and that better ventilation is provided to take off the ammonia vapors. This is not within the province of the painter, but belongs to the architect or builder. The best thing we know to overcome the trouble as it stands is to take the finest dry yellow ocher and triturate it with denatured alcohol, forming a thin paste, then reduce it with orange shellac to brushing consistency, and apply it to the surface without taking off the interior of spar varnish. This would be unaffected by the ammonia fumes, although dampness turns shellac varnish white. Still the ocher will make the latter feature less noticeable.

—520—

Refinishing Walnut Front Doors in the Natural.

Two pairs of walnut front doors, that were to be refinished, were in bad condition, the varnish having partly perished and partly alligatored, and must be removed.

If you use ammonia to remove the old varnish, we should advise you to mix two parts by measure of strong liquid ammonia 22 degrees Be. with one part of pure turpentine, in order to keep the grain from raising. If you are familiar, however, with any of the quick varnish removers, we would suggest to use one of these and follow directions found on label. In either case we would recommend to clean the surface thoroughly with turpentine or benzine and when dry, rub down with steel wool. Whether staining is necessary depends on the appearance of the surface after varnish has been removed. You can make a much better job by omitting shellac varnish and using a good rubbing varnish as a first coat, to which a very little burnt turkey umber in japan is added, if the wood has been affected by the weather, because of the perishing of the varnish. Next give another coat of clear outside rubbing varnish, which moss down carefully, using steel wool or hair, pumice, flour and water, and when good and hard, give two coats of outside finishing or spar varnish.

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Varnish for Boats Which Will Not Turn White in Water.

A varnish that will not turn white in long-continued contact with water is not generally used in boat finishing, as the price is prohibitive. Such a varnish can be produced only by the use of fossil rosins, such as amber or the very highest grade of kauri gum. The gum must be carefully fused with linseed oil varnish, previously prepared for the purpose, and the oil must predominate, the solvent being turpentine. Soft gums, like manila, etc., must be avoided in its preparation.

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Lusterless or Flat Varnish Without Wax.

A formula for a flattening varnish was desired. The inquirer had been using beeswax with his varnish in order to flat it, but had been told that a certain flattening varnish on the market had no wax in its composition.

We can give you a formula, recently published by an expert varnish maker, in the Oil, Paint and Drug Reporter, that has given excellent results on trial. It is as follows:—Saponify 10 gallons China wood oil by boiling in an ordinary varnish kettle with 11 gallons of water, in which is dissolved 8 pounds sal soda and 1 pound granulated caustic soda. In a separate vessel dissolve 20 pounds alum in 20 gallons of water, to be used later on. When the oil shows complete saponification and drops heavily from the stirrer, add 22 pounds pale rosin, pulverized, so that it will melt quickly. As soon as the rosin is melted and thoroughly incorporated with the soap add the alum solution, which will cause the mass to separate on stirring. Let the mass stand over night and then pour off all the water possible or syphon off with a hose, put kettle back on fire and drive off the remainder of the water by heat. Then dissolve the residue in 70 gallons of turpentine. Mix equal parts by measure of this dilute soap and any Manila or kauri varnish you may wish to dry flat. Of course, a rubbing varnish is most easily flattened in this way, while a slow-drying coach or outside varnish will not suit for the purpose.

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To Imitate Rubbed Work.

Mr. Gresser gave a formula by which he successfully imitated rubbed work. They build up a foundation by using filler and two coats of varnish. His dull drying varnish he prepares in this way:—He takes one gallon of hard oil finish and heats it to simmering. Into this, while hot, he pours six ounces of melted wax, and adds two ounces of sweet oil. While this mixture is still hot, he adds three pints of turpentine, making about two gallons of dull varnish. This is then filtered into varnish cans, which must be left uncorked until they are cool. Everything must be kept very clean. In applying this varnish, care must be taken to avoid lapses. He uses badger hair brushes, laying off the work one way and feathering it the other way. This must be done very rapidly as it sets quickly, but it makes a nice smooth job. For windows you use good exterior varnish. The sweet oil retards the drying.

Mr. Luthe did not believe the sweet oil was any good, and thought sooner or later Mr. Gresser would be up against it.

Mr. Millard said if Mr. Gresser had said China wood oil instead of sweet oil he would have agreed with him. He asked how long it took this varnish with sweet oil in it to dry. You would get a better result with carbon oil or coal oil. There isn't a man who can put a large panel of varnish on without showing some little roughness.

Mr. Dietrich said that if a man wants a rubbed coat, give it to him, and if he wants a waxed finish give it, just as he specified.

Mr. Gresser said that in the formula given they use Valentine's gold size japan to counteract the non-drying quality of the sweet oil, a tablespoonful to the gallon of hard oil and two tablespoonfuls to the gallon of outside varnish.

Ohio Convention, 1907.

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Specifications for Staining, Varnishing and Polishing Hardwood and Soft Woods.

All woodwork to be well cleaned up and made in readiness for the painter, as it is impossible for the painter to make a first-class job of finishing without a first-class job of woodwork.

First, give woodwork one coat of paste filler and stain the filler to suit. If, however, the color desired cannot be obtained by staining of filler, it will be necessary to stain the woodwork with water stain before applying paste filler.

After enough surface has been covered with the filler, so that what has first been applied begins to flatten, the process of wiping should immediately begin, using rags, waste or excelsior and first rubbing across the grain of the wood, being careful to clean all the filler from the surface of the wood and picking the filler out of all the corners and creases.

Second, apply one coat of grain alcohol shellac, then putty, care being taken to match woodwork in all its shades and to be kept a couple of shades darker than the woodwork, especially where woodwork is not stained. The natural wood has a tendency to turn darker and putty remains same color or turns lighter. For the same reason putty should be confined to the nail holes, cracks or imperfections to be puttied.

Then give three coats rubbing varnish of approved brand, costing \$2.50 to \$3.50 per gallon for inside work and \$4 for outside work. Rub between each coat with fine sandpaper or hair cloth and last coat to be rubbed with pumice stone and water to a dull finish and pumice cleaned off with a cleaning oil. If a high polish is desired, finish by rubbing with rotten stone and oil.

Twenty-four hours should be allowed between stain and filler and twenty-four hours between filler and shellac and twelve hours for shellac to harden. Three days should be allowed between each coat of varnish and four days after last coat and before rubbing; for outside work, one or two days longer between each coat.

Where woodwork is redwood, pine, maple or other close grained wood, omit the paste filler and substitute a coat of shellac, otherwise as before specified.

Where a wax finish is required the foregoing specifications will apply too. Second, apply one coat grain alcohol, shellac and puttying. Then apply two coats prepared wax and rub with cheesecloth to an eggshell gloss.

Finishing floors:—Hardwood and softwood same as specified for standing finish with the exception that varnish used for floors should be a first-class floor varnish, manufactured especially for floors.

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Solvent for Asphaltum Varnishes.

What material could be used to body up gasoline or benzine and at the same time not to interfere with the drying of turpentine or benzine asphaltum varnishes? Some sort of material was wanted that would give benzine or gasoline a consistency approaching that of linseed oil. Color is immaterial.

We would say that gasoline should not be used in paint or varnish at any time, because it is too volatile and inflammable. The degrees of Beaum of gasoline range from 72 to 75, while benzine may be obtained as low as 55 degrees and generally no higher than 62 degrees. The safest material we know of for the purpose would be rosin, and the darker grades, as B or C; even black rosin would answer. Rosin may be powdered and stirred into benzine, when it will readily dissolve on constant stirring. Small quantities of such solution added to hard drying asphaltum varnish would not seriously interfere with its drying, but large portions would produce tackiness. Refined liquid coal tar can also be added to asphaltum varnish, but the coal tar must not be cut with benzine, as they do not amalgamate readily. To reduce the consistency of liquid

coal tar, coal tar naphtha, also known as light oil, is the best medium. We should advise you to go slow on these propositions and try it out on a small scale first to avoid financial losses.

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Flat Drying Black Varnish.

How can black varnish be made to dry dead flat without the addition of wax or without resorting to rubbing? The questioner had in view the use of a fat or oil varnish.

The effect desired may be obtained by thinning a fine grade of ivory black, that has been ground to a medium stiff paste in a high grade of quick drying rubbing varnish with pure spirits of turpentine to very thin consistency and applying the same with a camel's hair brush of convenient width over a black ground with high eggshell gloss. In order to prevent streaks the work must be done rapidly, simply on the black and crossing once only.

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Varnished Table Tops That Will Stand Heat.

A treatment is wanted for an old walnut table top, that will prevent the cloth from sticking to the varnish when hot dishes are placed on it.

The fault lies in the varnish, if a moderate amount of heat makes the tablecloth stick to the varnish. Very likely the varnish is not made of a hard enough gum, as anything in the varnish line is frequently considered good enough for furniture. This may be so for cheap furniture, but will not answer for the tops of tables on which hot dishes are being placed. In the case above cited, we would recommend a rubbing down of the top with powdered pumice and water, thereby removing the old varnish and preparing a level, well filled surface. This done, a coat of good, hard drying, rubbing varnish should be applied, and when this is dry it is rubbed with flour of pumice until even and washed off. Now it is rubbed with rotten stone and sweet oil, the oil cleaned off and the surface polished with the hand or chamois leather.

If this method is too expensive, the rubbing may be dispensed with and the varnish surface simply "haired or mossed," but the varnish must be of the best quality.

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To Make Varnish Dry Without Luster.

Dissolve one-fourth pound white or yellow beeswax in a pint of turpentine in a steam bath, same as glue is dissolved. It is best to slice the wax first, as it will dissolve more readily that way. When this is added to one quart of varnish, the mixture will dry nearly flat. If an eggshell gloss is desired, only half the quantity of wax and turps should be added to a quart of varnish. The wearing properties of the varnish are not injured by this addition.

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Silking, or Enameling, of Varnish.

F. B. Gardner, formerly superintendent of the varnish department of Brewster & Co.'s renowned carriage works, in New York city, defines this deviltry in varnish as follows:—Silking, or enameling, defines a varnished surface, which, on drying, assumes the appearance of silk or pressed leather. He says that it may be caused by varnishing in a room where the temperature is below 70 deg. F. or where there is draught or it may be caused by the addition of turpentine to the varnish without allowing it to stand long enough to amalgamate

with the oil and gum in the same. We would add to this that varnish applied on damp, humid, sticky days, or the use of a brush from which the oil has not been thoroughly removed or the mixing of different brands of varnish will also bring about this condition of surface, and that the only remedy known is to remove the objectionable coat by rubbing down with pumice and water.

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Colorless Spirit Varnish for Labels, Whitewood, Etc.

Dissolve five ounces bleached shellac in one quart of 95 per cent. grain alcohol. When well dissolved, add one-half pound of granulated animal bone black that has been heated to drive off moisture that may be present, and boil all in a water bath for five minutes. Now filter a small quantity through filter paper, and if not colorless enough add more bone black and boil again. When test turns out satisfactory, filter the hot varnish through silk first and through filtering paper. In place of the grain alcohol methylated spirit may be used, if the odor is not objectionable. The varnish must be applied quickly, as it sets very rapidly.

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Varnish to Prevent Brass Tarnishing.

Place one ounce of pulverized gum shellac and one pint of methylated spirit in a bottle, which cork tightly. Keep in a warm place and shake once in a while. When the shellac is dissolved, pour off the clear fluid and apply it with a camel's hair brush to the brass, which must be well cleaned and polished, and if it is possible, heated before the varnish is applied. The varnish can be had very clear and transparent by filtering it through asbestos fiber.

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The Darkening of Shellac Varnish in Metal Packages.

To prevent shellac from darkening it must not be kept in metal packages such as tin or iron. It may be kept in wood, but stone or glass jars are best, and either of them must be very clean. You can dissolve gum shellac in cold grain alcohol, wood alcohol or acetone, but the former is the only medium that makes a first class shellac varnish. Put four pounds gum shellac in a jar with one gallon 95 per cent. grain alcohol and cork up well. Stand in a warm place and occasionally shake, until the lac is dissolved, which will be in a few days. The process may be hastened by placing the jar in warm water first and, when well warmed up, in fairly hot water. Shellac varnish so made and kept in glass will not darken or blacken and answer every purpose.

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Treatment of Varnished Floors Before Revarnishing.

The scratches and indentures from shoenails will surely show through any coat or coats of varnish that may be applied, unless the floor is sandpapered first with coarse and then with smooth sandpaper. The sandpapering must be done with the grain of the wood or the scratches made by it will also show through the varnish. If two coats of varnish are not considered too expensive, I would recommend a first coat of hard drying rubbing varnish, not flowed on, but rubbed out well and if the desired effect will permit, slightly stained to hide scratches and indentures with the appropriate color (ground in japan and first thinned somewhat with the varnish before it is added to the rubbing). This coat, if the job is to be a very good one, should be mossed with hair and pumice, but the latter proceeding may also be dispensed with and the surface merely dusted before finishing coat is applied, which should consist of a hard drying,

yet elastic, floor varnish. If the job is to be hurried very much, a full coat of shellac varnish may be given in place of the rubbing varnish, and the floor varnish on top of this. Unless the floor is to have a very high luster, the two coats of varnish mentioned are sufficient. One gallon of varnish should cover from 450 to 500 square feet of floor space, one coat, if the old varnish is not too much worn.

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Shellac Varnish That Has Separated on Long Standing.

A five-gallon bucket of orange shellac varnish, warranted pure gum, and found to be of good quality when bought in the fall, was allowed to stand all winter in a place without heat. On opening the package in the spring it was found that the gum had separated and was in the form of liver. Removing the bucket to a warm room, and frequently shaking it failed to make the material come together. On heating a portion, it apparently dissolved, but separated on cooling.

We believe that the trouble is due to a loss of strength in the solvent, caused by evaporation, and it is also possible that moisture has been absorbed in some way. The material should be placed in a kettle that is set in a water bath, similar to that used for melting glue, and while thus being heated it must be well stirred; then more spirit should be added to make up for what has been lost during the heating.

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Should Gold Leaf Be Varnished?

Genuine gold leaf will not tarnish from exposure to weather, even salt air, and is better left unprotected by varnish for two good reasons. First, any varnish, no matter how pale and transparent, will dim the luster of gold; and, second, varnish is sure to crack in a year or two, giving the gold an appearance of perishing, while when the gold leaf is left free from varnish it will remain bright and lustrous for years.

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Which Is Best, Liquid Filler or Shellac Varnish?

We would say that for ordinary work the commercial liquid fillers are more economical and useful, especially for soft woods, where beauty of the grain is of minor importance. However, where a high finish and rich effects are looked for, it is advisable to use shellac varnish instead of liquid fillers, which always produce a more or less clouded effect and tend to yellow off in time.

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How to Dissolve Gum Shellac Properly.

Failure to dissolve white (bleached) shellac in grain alcohol shellac so that it remains in suspension may be due to inferiority of the gum or to lack of strength in the alcohol.

When the bleached shellac gum is pure and in good condition and the alcohol between 92 and 95 per cent, there should be no appreciable settling out of the gum. When we speak of 92 per cent. alcohol, we mean that the liquid must contain 92 per cent. absolute alcohol and 8 per cent. of water in one hundred parts by weight, or when 95 per cent. alcohol is mentioned, it means that one hundred parts by weight of the liquid should contain 95 per cent. absolute alcohol and 5 per cent. water. Spirits of less strength will not cut gum shellac properly, and alcohol absorbing moisture very freely must be kept tightly sealed up. When purchasing white or bleached shellac, it is best to buy it in twist form and not in the pulverized state. To keep these twists in good condition a keg should be half-filled with water and placed in a cool part of the

shop and the twists of gum shellac placed on a crate above the water in the keg and the same covered with a cloth, and the water should be renewed from time to time. This method will keep the gum in good condition. If left in a perfectly dry place it becomes crumbly and useless, while when kept under water it tends to blacken and mold. To prepare the varnish inclose the gum shellac in a strong bag and beat with a hammer or iron pestle; sift out the fine particles and continue the operation until it is all pulverized; place the powder in a wide-mouth glass bottle or jar and pour over it the required quantity of 95 per cent. grain alcohol; close the bottle with a glass stopper and agitate by oft-repeated shaking. If the receptacle is first placed in moderately warm water and then in hot water, it will hasten the solution and produce a clearer varnish. The addition of Venice turpentine adds toughness to the varnish and permits it to flow more freely, but does not add drying properties. It is recommended that for white shellac varnish of medium body the following proportions be used:—Two pounds bleached shellac, one-half pound clear Venice turpentine, 6 pounds 95 per cent. alcohol. White shellac varnish should be kept in glass only, as tin vessels tend to darken it. The reason for your complaint of the slow drying of the shellac varnish, that you purchase in ready for use form, must be looked for in the fact that commercial shellac varnish, even when grain alcohol shellac is asked for, is not made with that article, but with methylated spirit, and it stands to reason that manufacturers cannot supply the orthodox article at the price quoted. The Painters Magazine in the September, 1899, issue, gave a full and thorough description with illustrations in an article entitled:—"How Shellac Is Manufactured," from which we will quote:—Lac is a resinous incrustation formed on the bark, twigs and branches of various trees by an insect known to entomologists as the *Coccus Lacca*. It is found in most of the provinces of East India and in Bengal, Assam and the Central provinces; also in Siam, Ceylon and some of the islands of the Western Archipelago. The resin is gathered by the natives at various seasons and ground in stone mills in a rather primitive manner, by hand, then sifted so as to free it from barks, twigs, etc. Then the ground sticklac, so-called, is taken to the wash-room to free it from the lac dye, a beautiful permanent red color. When it has been washed, it is spread out under cover and permitted to dry and finally carefully selected according to color and melting quality into the particular grade of shellac which is to be manufactured. The ground lac is now packed into a cotton pipe or cotton bag, somewhat resembling a canvas fire hose pipe.

In the fire room this cotton bag is hung up about 18 inches above a charcoal fire, and twisted by sticks inserted at either end and operated in opposite directions by two natives. As the melted lac oozes through the meshes of the cloth pipe, it is scraped off and passed to an operator, who dexterously spreads it over an earthen jar filled with hot water. The lac is then rubbed down with a cloth to an even surface and stripped from the jar. The thick sheet of shellac is again heated before the fire on both sides; then stretched and pulled in all directions by hand, into a large sheet, then broken up and laid aside to season, preparatory to shipment. The labor of 250 persons is required to finish 20 cases in one day of 12 hours' work. Shellac is bleached by heating 10 parts of the orange shellac with 4 parts of soda in 120 parts water in a copper kettle, and when dissolved, the liquid is filtered through cloth into a wooden tub. Ten parts chloride of lime are mixed with a solution of 10 parts soda in 200 parts water, and filtered into the shellac and soda solution. When the two solutions have cooled off, a small portion of dilute hydrochloric acid is added, until some of the shellac separates; then it is permitted to rest for a few days and the shellac precipitated with hydrochloric acid.

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Flowing on Varnish or Enamel Paints.

Flowing on is the opposite of brushing out, and means that the varnish or paint is to be applied in a heavy coat and not crossed or recrossed more than is necessary, so as to give the material an opportunity to level itself to a mirror-like surface.

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Preparation for Flatting Varnish

An article was wanted that would flat varnish so it will not scratch and that paint applied over it will not peel. The inquirer had heard that Danish painters use a powder which they grind in turpentine and mix with the varnish to obtain the result referred to.

We have not heard of the powder you refer to, nor do we know of any preparation that will keep varnish from scratching. At any rate, what has the flatting to do with the scratching? Varnish that will dry flat and hard can be made by treating the resins, or gums, with caustic soda and after a thorough washing and drying of the resulting precipitate, it may be dissolved in either benzine or turpentine, producing a dead flat surface of great hardness in either case, when applied in the manner of varnish. Why not buy a flatting varnish, instead of risking spoiling a lot of good varnish by adding to it something unknown or untried?

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Transparent or Colorless Varnish for Marbleized Work.

It depends very much on the kind of work you are to undertake and what you can afford to pay for your varnish. For quick work dissolve:—

5 pounds refined bleached shellac, and
2 pounds clear Venice turpentine in
16 pounds 95 per cent. alcohol

If the work is to be merely ornamental, a varnish made on the following formula will answer for interior work. It is perfectly transparent and will dry quickly:—

10 pounds Water White Rosin.
2 pounds Crude Turpentine,
8 pounds 95 per cent. Alcohol.

Or for slow drying:—

10 pounds Water White Rosin
2 pounds Crude Turpentine,
2 pounds Spirits of Turpentine,
6 pounds 95 per cent. Alcohol.

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Preparation of a Leather Varnish.

We presume that you have in view a black varnish for leather that dries quickly and with good body and gloss. If that is the case, we can give you two formulas, from which you may select, as follows:—

No. 1.

4 lbs. Dry D. C. Shellac,
2 lbs. Gum Thus or Crude Turpentine,
5 lbs. Manila Gum.
25 lbs. 95 per cent. Alcohol,
 $\frac{3}{4}$ lb. Aniline Black.

No. 2.

4 lbs. Dry D. C. Shellac,
4 lbs. Crude Turpentine,
4 lbs. Rosin.
22 lbs. 95 per cent. Alcohol,
 $\frac{3}{8}$ lb. Aniline Black.

Either of these may be made in the cold way by dissolving gum and rosins in the alcohol, and adding the aniline black, after it has been dissolved in part of the alcohol.

Should you desire to make simply a gloss for leather, something cheap, we would advise you to employ the following formula:—

Take one pound of good animal glue, soak it over night in cold water bath and then dissolve one pound of ordinary soap in hot water and mix it with the warm solution of glue. To dissolve either of these use three gallons of water or six gallons for both. To the mixture of the two solutions add one quart of boiled linseed oil, then one pound of good wheat starch, which has been well mixed with part of the six gallons of water mentioned above and put through a fine strainer to prevent lumping. Put this mixture over a moderate fire and boil to a fairly thick paste. It may be used warm or it may be put in a form or mold, where it can be evaporated and made into cakes or tablets, which afterward may be mixed with stale beer or water. To produce a good gloss on leather apply as thin as possible. It makes leather durable and gives it a new appearance, though not as high a gloss as the spirit varnish referred to above.

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Red Coloring Matter for Shellac Varnish.

Can red shellac varnish be made with other pigment outside of English vermilion?

Yes, there are quite a number of coloring materials that can be used in that connection, but none of this will give an exact match in color. Among the vegetable red coloring matters, we have dragons' blood, red sandal wood, and ruby red shellac. There are also any number of coal tar derivatives that are soluble in spirits of wine, and which will answer for imparting red color to shellac varnish from scarlet and crimson to purple, some of which are fairly fast colors.

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To Prepare Pure Shellac Varnish in a Small Way.

Place one pound pale orange gum shellac in a wide-mouthed glass bottle and pour over it one quart 95 per cent. grain alcohol (cologne spirit) or denatured alcohol. Over the mouth place a piece of pig's bladder that has been moistened with water and tie it firmly down, then perforate the bladder. Set the bottle in a warm place, or, better still, in warm water of about 150 deg. F., shake it frequently and when all the gum is dissolved, decant the solution from the sediment. When using put a teaspoonful on a woolen rag with a few drops of sweet oil and wrap the saturated woolen rag into a linen rag when it is ready for use.

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Discoloration of Gum Shellac Varnish.

Why shellac varnish becomes discolored, especially white or bleached shellac, when kept for any length of time in tin cans:—

Many distributors of shellac varnish have for some years past, when putting up their goods in small quantities or rather small sized packages for dealers, made use of glass bottles or glass jars, because they have profited by experience. The discoloration is caused by rust forming in the tin cans, due to the presence of water in the solvent. The manufacturers cannot afford to make use of alcohol that is absolutely free from water.

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Composition of Waterproof Varnishes.

India rubber or gutta percha dissolved in turpentine or solvent naphtha used to be the all-around medium for waterproofing paints and varnishes. But with the advance in science and the development of celluloid lacquers, the latter have

taken the place of the former. The best formulas are proprietary and not accessible for publication. In paints, as well as in some varnishes, waxes and insoluble metallic soap have played quite a conspicuous part as waterproofing mediums.

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Why Does Varnish Bloom Out and Sometimes Go Dead?

The blooming of varnish is mostly due to condensation of moisture upon a coat of varnish before the same has thoroughly hardened. There cannot be enough attention paid to thorough ventilation in closed rooms, as heat alone will not properly harden varnish. Dry floors are also essential. It must be remembered that varnishes must dry by oxidation, so long as they are composed of oil, gum and solvents. The usual remedy is to go over the surface with a chamois skin wrung out of clear water, permitting the surface to dry and applying another coat of varnish before the same has thoroughly hardened. There cannot be enough lumber that has been used in the article varnished, to imperfectly dried ground coats of color or varnish, or to absorption by dead undercoatings.

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Varnish Gum Trees.

The trees that produce kauri gum grow in New Zealand. There are trees now standing which are believed to be at least from 4,000 to 7,000 years old. So slow is the growth that a tree one hundred years old is no more than a mere sapling. These trees still produce varnish gum, but the gum taken from a living tree is too soft to produce high-grade varnishes, and the best varnish gums are fossil gums, dug up from the earth—the product of forests that have disappeared ages ago. The same thing is true of Zanzibar gum, except that it comes from Africa instead of from New Zealand.

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Colored Varnish for Basket and Wicker Work.

Formula for an elastic, yet hard-drying gloss coating for use on baskets and wicker work on veranda chairs, that will not become sticky under the warmth of bodies under certain atmospheric conditions.

Procure from a supply house a portion of heavy-bodied linseed oil (also known as blown oil) which must be so viscid that when a drop or so is placed between thumb and finger it can be drawn out in long threads. To one-half gallon of this oil add four and one-half gallons of a hard gum varnish, that will dry by itself when spread on a wooden surface within 18 hours. Mix oil and varnish thoroughly, then thin with enough spirits of turpentine to bring it to a free flowing consistency. To color the varnish use any of the oil soluble fat aniline colors, dissolving same in benzol and mixing it at once with the varnish.

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Determining the Body of Varnish.

The body or viscosity of varnish is determined by an instrument termed a viscosimeter. But we are not clear as to your question. Varnish makers, as a rule, figure on the number of gallons of oil to every hundred pounds of gum used in making a batch of varnish. The body of a varnish depends largely upon the quantity of solvents used in batches of similar sizes.

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Transparent Chinese Spirit Lacquer.

Formula for transparent lacquer that will produce the effect of antique Venetian glassware.

Take of pure gumlac eight ounces, of agate two ounces, of gum mastic four ounces, of gum sandarac that has been purified with lye, eight ounces and kauri or Zanzibar gum eight ounces. Pulverize and mix all of these and place the powder in a large wide-mouth jar. Add two quarts of best rectified grain alcohol, cork the jar and shake it vigorously. Then place the bottle in a pot of water that is near the boiling point and keep it there until every part of the gum has dissolved, then run the liquid through clean cloth while still warm and allow to cool. This lacquer will give you the effect desired, but great care in application is required. Another fine transparent lacquer of golden yellow color, with reddish tinge, may be produced in the following manner:—Take of best gumlac and best gum mastic each twelve ounces, six ounces gum sandarac, four ounces frankincense and three ounces agate. Powder all coarsely and mix, then put all in a wide-mouth jar. Place enough 95 per cent. grain alcohol in the bottle so that the spirit will stand over the gum as high as your hand. Stopper mouth of jar with cotton and shake the jar for a reasonable length of time. Then place the jar in a fairly warm place. Shake occasionally until all the substances are dissolved, and after straining place the lacquer into a clean bottle, cork up well and set aside for use. It is scarcely necessary to say that these lacquers should be applied in a warm room, but not in close proximity to an open flame.

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Lemon Oil for Rubbing Varnished Surfaces.

Like many of the essential oils, oil of lemon has the characteristic of being somewhat penetrating, it being liable to lift a film of oil paint when the latter is deficient in binding properties. When used on varnish on a rubber or piece of felt, it immediately dulls the gloss, even without the aid of pumice or kindred material usually employed in rubbing varnish. This oil will by friction alone produce a dull surface such as may be produced by mossing or hairing. On account of its high cost, 90 cents to \$1 per pound, we should say that the only real advantage of its use is the saving in time by the operator, who can do a job in one-third of the time required when using other rubbing oils. Of course, the rubbed surface must be cleaned off as is done in the case of other lubricants for rubbing varnish.

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Coloring Material for Spirit Lacquers.

C. Y., Cleveland, Ohio, writes:—Kindly inform me what coloring is most durable and also most convenient to use for coloring spirit lacquers. Please answer in as detailed a manner as possible and as far as space permits.

Answer:—In the selection of coloring for spirit lacquer the composition of the lacquer itself must be considered, especially the gums or resins. We presume that you have colored lacquers for metal, such as brass, copper, etc., in mind. If you want a fairly permanent golden yellow lacquer for brass, you can produce it without the addition of coloring by dissolving the reddish gum accroides, also known as Botany Bay or Black Bay gum. Of the aniline group of colors for spirit lacquers, only picric acid (for yellow) and nigrosine (for black) are permanent to light. The fading of colored lacquers is influenced by the resins or gums used in the clear lacquer. Gum shellac and myrrh are indifferent, gum sandarac, rosin and gum mastic accelerate the fading in a marked degree. Harry Smith has made exhaustive tests comparing vegetable coloring matter and coal-tar derivatives for permanency to light with the following result:—The vegetable coloring

matters, saffron, curcuma, orlean, dragon's blood and sandalwood, fade, and in addition to this saffron, curcuma and orlean exhibit a tendency to blacken brass under the influence of direct sunlight. Aniline colors, as metanil yellow, auranim and primulin, do not blacken brass and are therefore safer than the above. Dragon's blood is superior for producing copper colored lacquers to sandalwood because it does not fade as rapidly. Gamboge is best for coloring spirit lacquer yellow because most permanent and not apt to blacken brass.

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Testing Varnishes for Non-Blooming.

This property in a varnish can be established only by practical trial. Inasmuch as varnish, when applied over a light ground, will show only a faint bloom or none at all, even when it would show a decided bloom on a dark surface, it is best to use a wooden panel that has been surfaced with a red brown color, a deep maroon or Tuscan red for the test. This is suggested, because over such a ground the faintest bloom is perceptible. The groundwork, of course, must be smooth and thoroughly hard, and not have more than eggshell gloss and the varnish must be applied with a perfectly clean varnish brush. Furthermore, care must be taken that the room in which the panels are hung up for the drying of the varnish is itself perfectly dry, yet well ventilated, because the presence of oxygen is essential for the drying of the varnish. Another precaution for a successful and reliable test is to see that no bloom is brought about by exterior influences, such as the ingress of blasts of damp air, etc. Varnishes made from soft gums or non-fossil resins are most apt to show bloom, while those made from hard fossil gums and containing the proper proportion of oil are free from that fault.

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Manufacture of Hard Oil Finish.

Berry Brothers, of Detroit, Mich., we understand, were the first to place hard oil finish on the market, but every varnish maker in the country has his own brand at the present time, and, according to color, grade it as extra light, light and dark. It is intended for interior work only, as a natural finish for moderate priced woodwork, the better grades being used on white and yellow pine, although it is also used on hardwoods that have been treated with paste wood filler. It is also considered as a high grade furniture varnish and finds a ready market for that purpose. The name seems to appeal to many consumers and the trade in general. As to its constituents, it is simply a drying oil mixed by heat with ordinary rosin or low priced copal resin and thinned with turpentine, turpentine substitute or benzine, according to selling price. The usual process of manufacture is to boil raw linseed oil at from 480 to 500 degrees F. with a portion of litharge and manganese dioxide, allowing it to clear, when the drying mediums are well taken up by the oil. In another kettle copal (usually Manila gum) and rosin are melted, and when well fused the oil is added to the melted rosin in such proportions as has been established by practice to produce the results desired. The mass is then heated for a time, and when thoroughly amalgamated the kettle is taken from the fire to the thinning room, where the volatile thinners are added. While still warm the liquid is pumped from the kettle into a tank and then run through a filter press and finally into storage tanks. Hard oil finish can also be prepared from China wood oil and ordinary rosin, and these dry harder and with greater toughness than those made with linseed oil. The China wood oil is heated to 285 to 300 degrees F. for some hours, adding a few per cent. by weight of litharge. At the same time rosin is melted and hydrate of lime is added to the extent of 10 per cent., while the melting process is going on, also some drying medium, such as litharge or manganese dioxide. The China wood oil and the resinate of lime, while still hot, are mixed in equal parts by measure and the mixture thinned as above.

The hard oil finish made with linseed oil, copal gum and ordinary rosin can be toughened by adding from 10 to 15 per cent., by volume, of treated China wood oil to the finished product before it is filtered.

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Economical Method of Making Shellac Varnish.

Large users of shellac varnish want to try whether it would not be more economical to cut their own shellac and possibly have a better article.

For cutting shellac in quantities of say forty gallons, a so-called shellac churn is required. This consists of a hard wood barrel (an alcohol barrel being best for the purpose) that is fitted with trunnions on either end fastened to the barrel and which work in bearings on trusses, a pulley being provided on one end for a belt to revolve the barrel in horizontal position, while sometimes the trunnions are set to one side of the center, so as to give the churn an eccentric motion, which will accelerate solution. A so-called manhole with tight fitting closing device is put in the side of the barrel for the introduction of gum and solvent and the discharge of the finished shellac varnish. Very little power is required for the revolving of the churn, but it would hardly pay to have power installed for the sole purpose of doing this work. You may figure that, in order to produce forty-five gallons of white (bleached) shellac of medium consistency for brushing, you will require 150 pounds white gum shellac and thirty gallons of alcohol, while for a varnish of good body it will take 180 pounds gum and twenty-six gallons of alcohol. You must, however, take great care in seeing that your bleached shellac is not rendered insoluble by long exposure to the air and the hunks of bleached gum shellac are best kept under water until used, when they are dried and crushed and so introduced into the churn with the spirit. It is hardly necessary to tell you that pure grain alcohol is prohibitive in price for making shellac varnish unless for special purposes where first cost is not an object. Denatured grain alcohol (a mixture of 90 per cent. grain and 10 per cent. wood spirit, known as varnish makers' denatured) is superior by far to ordinary or deodorized wood spirit, because shellac varnish made with the latter as the solvent sets too rapidly and yet does not dry as hard. Refined or deodorized wood alcohol is usually sold under such names as Columbian or Eagle Spirits. Every time a batch has been made the churn should be drained and cleaned of any sediment.

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Lacquer Discoloring Polished Brass.

It is a well-known fact that wood alcohol will discolor when stored for a long time in tin. While filtering through charcoal or bone black will eliminate the discoloration in alcohol, it is doubtful whether such process would remedy the evil in this case, because in the first place the gum in the lacquer would be retained by the filtering material and thus the binder in the lacquer would be lost. In the second place, it is possible that the discoloration of the brass may be due to the acidity of the resin or gum in the lacquer, and in that case there is no neutralizing agent that we know of whose use would be successful. If the acidity in a resin or gum is not neutralized before it is dissolved in the medium or solvent, it cannot well be done afterward.

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Proper Ageing of Hard Gum Varnish.

How long a Kauri gum varnish should remain in a tank to get the proper age before it should be placed on the market for sale or to use.

We do not know of any set rule that is applicable to the time limit when varnish of any kind is sufficiently aged. It depends a great deal on the composition of the varnish whether it is the so-called long or short stock. The term

long stock is used for hard gum varnishes that carry the maximum quantity of linseed oil anywhere from twenty-four to thirty gallons to each 100 pounds of pure gum, while short stock usually does not carry over eight gallons of oil to 100 pounds of gum. The long stock and short stock is blended when medium grades are wanted, but only after they have been filtered and settled. It stands to reason that varnish manufacturers, as a rule, do not care to age their varnishes indefinitely or keep them longer in storage than is absolutely required. We should say that for a Kauri gum varnish that is well made and filtered a storage of thirty days in a temperature of 70 degrees F. is sufficient, while of course sixty days' storage would benefit it some. For a varnish to be used on interior woodwork, we do not think it advisable to have it in open storage tanks for over a month, because interior varnishes carry more volatile spirit in proportion to exterior varnishes, and are therefore more prone to fattiness. An interior varnish that is made with kauri or manila gum if used too soon, say a week or two after filtering, on interior woodwork is apt to prove sandy, but this same varnish will after one month's standing turn out perfectly smooth work.

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Good Varnish for Wooden Patterns.

Pattern varnishes are to be classed under the heading of spirit varnishes or lacquers. There are clear or transparent varnishes and colored pattern varnishes, the latter being generally only in orange, yellow, red or black. The requirements for a good pattern varnish are, first, a mirrorlike gloss, and second, great hardness and durability, so that the pattern may serve its purpose as long as possible. In order to accomplish the latter, it is necessary to select, aside from shellac, only such resins as will give the required toughness and hardness of surface. It is self-evident that only such resins as are spirit soluble can be considered in this connection. The best pattern varnish consists of shellac, dissolved in pure grain alcohol, but owing to the tax on this commodity denatured grain or wood alcohol is mostly employed. But there are many pattern varnishes that contain but a small portion or no shellac at all, as will be seen by the following formulas:—

I. Fifty parts, by weight, of orange shellac and twenty-five parts of powdered kauri gum are dissolved in 165 parts denatured grain alcohol in a steam bath. This makes a deep orange colored pattern varnish of very good quality.

II. Twenty parts, by weight, of orange shellac, ten parts of red gum accroides and ten parts of yellow gum accroides are dissolved in 100 parts denatured grain alcohol in a steam or hot water bath. This produces a fair grade of pattern varnish also dark orange in color.

III. Fifteen parts gum sandarac, fifteen parts red gum accroides, twenty parts kauri gum and one part gum elemi are dissolved in seventy parts of denatured grain alcohol in a steam or hot water bath. This will also produce a fairly good grade of pattern varnish.

When it becomes necessary to make pattern varnishes at still lower cost, ordinary rosin of the proper color or grade may be in part substituted for the kauri gum or gum accroides in the formulas given, but it is not worth while to substitute wood spirit for the denatured spirit, as the latter is actually lower in price than the former and is not so obnoxious to the workmen. All these varnishes, no matter by what formula they are made, must be filtered to remove the impurities in the resins or gums, and a few thicknesses of cheesecloth will answer if no other filtering apparatus is at hand. Colored pattern varnishes are not expected to stain the wood only, but should cover it solidly. Hence it is necessary to have an intimate mixture of the body color and the varnish. For the black, lampblack or ivory black should be triturated in alcohol, and when well softened part of the varnish beaten into it, and this mixture added to the balance. For the red, extra fine bright oxide of iron red treated in similar manner will usually answer.

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What Should Asphaltum Varnish Be Composed Of?

True asphaltum varnish as we used to know it consisted of Syrian asphalt for the very best grade and Trinidad or Cuban asphaltum, and, later on, Utah Gilsonite for the next best grades, all of which were natural products. These were melted in iron kettles over open fires, in the varnish factory, and fused with linseed oil and such drying mediums as litharge and manganese oxide, and finally thinned to brushing or flowing consistency with pure spirits of turpentine or benzine. The brands were marked T for that which had turpentine for solvent and B for the one that had benzine for the solvent. Turpentine asphaltum varnish, with a liberal percentage of linseed oil in its composition, makes an excellent black baking varnish of great adhesive and elastic properties, and when baked on metal resists the strongest varnish removers known to the trade. True or natural asphaltum varnish, with benzine asphaltum, will not answer the purpose as well, even if it contains a like portion of linseed oil. Competition, however, and the indifference of the consumers, who considered first cost paramount to quality or durability, induced manufacturers to add rosin, at a time when it was low in price, to natural asphaltum and substituting candle tar for linseed oil, later on omitting natural asphaltum altogether, using coal tar or petroleum residuum in its place. In the latter case, petroleum spirit of high boiling point is used in place of ordinary benzine, so that the so-called asphaltum varnish flows easily. These artificial asphaltum varnishes are not manipulated with direct fire, but in kettles that are heated by steam and contain a stirring device. The petroleum distillate used with that kind of so-called asphaltum should have a boiling point of 250 deg. F. and specific gravity of about .88, while ordinary benzine has a specific gravity of .725 only.

The market price, when quoted by a reliable manufacturer, will serve as a guide to the quality of asphaltum varnish, but it is doubtful whether true asphaltum varnish can be obtained at the present time unless specially ordered from a reputable varnish maker.

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Light Copal and Damar Varnish with Petroleum Distillates Flatting.

Wanted to know whether damar or light copal varnishes, that contain large percentages of mineral oils in place of strictly pure turpentine only, would have a tendency to cause checking, cracking and softening up of undercoats on walls and ceilings that were painted with two coats of strictly pure white lead and linseed oil paints, allowing about ten days between each coat and the same length of time before either of the varnishes referred to were applied?

Would a damar varnish containing a large percentage of mineral oil used on walls and ceilings, as mentioned, be responsible for the entire surface turning flat in less than two weeks, the surface before being varnished being uniform and as perfect as any surface could possibly be prepared by any painter?

While we have not had an experience of the nature you are describing, it is altogether possible that damar varnish, that contains any appreciable percentage of petroleum distillate, such as are now on the market as substitutes for turpentine, which are different from ordinary petroleum benzine, because heavier in specific gravity and less fugitive than the latter, is liable to flatten under certain conditions, and the same may happen in the case of a so-called copal varnish that contains a solvent of the same nature. But that either of these should have a tendency to cause checking, cracking and softening of perfectly hard coats of paint, which we must assume were really in condition to receive coats of varnish after ten days, is difficult to explain. If we had not your assertion to the contrary we should believe that the undercoats of paint contained heavy mineral oils, and on that account were not really dry and hard enough for being varnished. or does it seem probable that the petroleum distillate in the varnishes referred to should act as a solvent on the paint. While these

heavy benzines act in many ways, especially in flat paints, pretty much like turpentine, they will retard oil paints to a great extent in drying and are of merit only in the production of low-priced varnishes and in flat paints, where ordinary benzine is too rapid in evaporation and also too risky because of its low flash point. Light copal varnishes are made from pale rosin, with a small portion of linseed oil and certain percentages of China wood oil, with either benzine or the petroleum distillates referred to as solvents or thinners, and if this solvent is of the proper quality we see no reason why it should act as you have described. With damar varnish the cause is somewhat different. Damar gum is a resin which is insoluble in petroleum spirit, be it ordinary or heavy benzine, but it is wholly soluble in spirits of turpentine. When damar varnish is sold at a low price it may be readily discovered by its odor that it is not true gum damar dissolved in turpentine, but that it contains petroleum distillates and ordinary rosin, treated by a method best known to varnish makers. When benzine is added to true damar varnish dissolved by pure spirits of turpentine, there will be a separation and no intimate mixture can be made, unless rosin is added, that is held in suspension by the benzine. Possibly, from the information here given you may solve the problem. Not being on the ground we are unable to assist you in the search for the cause of the trouble.

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Gum or Resin Insoluble in Alcohol.

There are very few resins or gums that are not wholly or partly soluble in 95 per cent. alcohol or absolute alcohol. Zanzibar gum, also known as goose skin copal, from its appearance, is least affected by 95 per cent. alcohol and only slightly by absolute alcohol. Fossil amber is not at all soluble in 95 per cent. alcohol and only very little affected in boiling absolute alcohol. Ordinary pine resin, gum accroid, Manila gum and Borneo gum are readily soluble in 95 per cent. alcohol, while most all of the African copals and Kauri gums are partly soluble (up to 40 and 50 per cent.) in 95 per cent. and absolute alcohol. It has been ascertained that all copal gums consist of several resins and more or less of etherial oils, which latter evaporate by dry distillation. Some of the resins are soluble in alcohol while others are insoluble in this spirit. When gums and some of the harder resins are fused, that is, when they are melted with high heat and mixed during this process with metallic oxides or drying salts, such as litharge, red lead, manganese, dioxide, etc., in quantity, they become insoluble in alcohol, while they are soluble in turpentine, benzole or benzine, especially when vegetable oils are added after the gums or resins have been fused. Hence we may say that any quick drying hard gum varnish with short oil proportion is really or practically insoluble in alcohol. Methyl alcohol (wood spirit) and 90 per cent. denatured alcohol will not dissolve gums or varnishes that are only partly soluble in absolute alcohol. As to the source from which to obtain the goods desired, consult the advertising columns of this magazine or your regular supply house.

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Time Required for Making Hard Oil Finish.

The oil should be heated or rather boiled for two hours; that is to say, it should be two hours from the beginning of the boiling to the time when it is added to the melted gum. The mixture of boiled oil and melted gum must be boiled on a moderate fire until the added drying mediums are well incorporated and the mass exhibits the proper stringiness; that is, the oil and gum must not separate on dropping a little on glass, and when placed between thumb and finger it must not break short, but pull out in strings. The operation will require from two to three hours, according to the hardness of gum used. Very much depends upon the temperature and the uniformity of the heat, and no set rules can be given.

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Clouding of Orange Shellac Varnish on Dissolving.

Shellac consists of about 91 per cent. resin (gum), 44 per cent. fatty substance, 3 per cent. gluten, balance being coloring matter and moisture. Its solution in cold alcohol or ether is always cloudy or flocculent. When dissolved in warm or hot spirit the solution is clear, but on cooling the fat comes to the top and finally sinks to the bottom of the container. If the alcohol contains more or less water the fatty substance remains longer on top of the solution. Unless you use refined gum shellac you must filter your solution if you want the shellac varnish to be clear or transparent, for only in this way will you get rid of the cloudy portion. Or you may add to the solution a quantity of dry whiting equal in weight to that of the dry shellac used, shaking it often for two days, then allow to clear. Pour off the clear portion and filter balance through fine cheesecloth.

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Varnish or Lacquer for Straw Hats.

The first consideration for such a varnish is that it must not make the straw brittle, and therefore render the fabric easily breakable. This would bar out inferior coatings at once. The best varnishes or lacquers for the purpose are solutions of gum mastic in alcohol, which may be made still harder by the addition of bleached shellac and somewhat cheapened by further adding gum elemi. The following proportions will produce an excellent varnish for the better grades of straw hats:—Three pounds gum mastic, one pound bleached gum shellac and one pound gum elemi are powdered and dissolved in two gallons 95 per cent. alcohol; the best denatured spirit will serve the purpose. For a cheaper varnish one pound mastic, one pound sandarac, one pound bleached shellac and two pounds pale gum copal (manila) are powdered and dissolved in two gallons methyl spirit (wood alcohol). In either case the solution must be filtered, and to make the varnish or lacquer more elastic and more free in working properties a small portion, say one or two tablespoonfuls, of castor oil may be added to each gallon of the solution. If the varnish is to be colored spirit soluble aniline colors, such as nigrosene for black or Bismarck brown for brown, etc., may be used. The coloring matter may be added to the solution in the dry powdered form, but it is safer to dissolve the powder in alcohol first and add it to the varnish in solution. The aniline is best dissolved by using one pint of spirit to one ounce of the powder, shaking it frequently until all the color is in solution.

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Preventing Varnish from Striking Through Paper.

Fat varnishes will always be absorbed by paper, strike through the paper under any conditions, unless the paper is specially prepared by a suitable size, that adds to the cost, while spirit varnishes will strike through only when made too liquid. When the latter are of the right consistency the paper requires no extra preparation by a special size, such as a solution of glue or gelatine, or a solution of albumen or starch paste, that is absolutely necessary when fat varnish or volatile oil varnish is used. This is the reason for damar and other varnishes going out of use for coating paper, and the rapid drying of spirit varnish is also conducive to their increased use. A first-class spirit varnish that will not strike through paper may be made by powdering 36 parts by weight of gum mastic and 18 parts by weight of gum sandarac. In order to facilitate the solution of the powder, add 20 parts by weight of ground glass. Place in a suitable vessel and add 200 parts by weight of 96-per-cent. alcohol; the deodorized article will do to prevent cost being too high, or the use of wood alcohol. When the gums are dissolved add 20 parts true Venice turpentine, previously liquefied with pure spirits of turpentine. Mix thoroughly, then filter to remove impurities.

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Methods for Manufacturing Celluloid Lacquer.

While you could prepare this lacquer directly from gun cotton, it is safer and more economical to use clear celluloid chips that can be procured from manufacturers of celluloid articles. To manufacture it in a commercial way it is necessary to have an apparatus in the shape of a drum, that is well tinned inside and provided with a stirring device. The drum must be air tight. For small quantities a wooden keg, that is lined with tin and has a removable lid, that can be fastened with screws, will serve the purpose, but it also should have a stirring or churning device. The celluloid in finely cut chips is introduced with a portion of the solvent, stirred for a short time until the celluloid is well saturated; then the balance of solvent is added and the stirring device brought into action. When the celluloid is dissolved and while still being agitated the castor oil, as given in the formulas, is added for the purpose of making the lacquer spread more easily and leveling down smoothly on the surface it is to be applied on. This done, the lacquer is put into a settling keg or barrel in order to clarify. All the work must be done in a fairly warm room and care must be taken that all apparatus, receptacles and the solvent itself are free from water. The following formulas produce good lacquers:—Six parts by weight of clear celluloid chips, sixty parts amylacetate, thirty-three parts acetone or denatured alcohol and one part castor oil, all by weight; or five parts celluloid, fifty parts amylacetate, twenty parts amylalcohol, twenty-four parts denatured alcohol and one part castor oil, all by weight.

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Black Flat Lacquer for Cameras.

Formula for a good black coating for the inside of photographic cameras and similar apparatus, something that will dry a dead flat throughout and show no streaks of gloss.

The best coating for the purpose is made by adding to celluloid flat lacquer the necessary quantity of finest grade of lampblack. The celluloid flat lacquer may be made by dissolving 8 parts of celluloid shavings in a mixture of 100 parts each of sulphuric ether and alcohol, all by weight, and adding after solution is effected 75 parts pure spirits of turpentine. The lampblack, before adding to the lacquer, should be rubbed up in alcohol to creamy consistency and the finish flat lacquer sifted through cheese cloth. This lacquer will adhere well to aluminum metal without any previous treatment of the metal.

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Copal Oils, Their Characteristics and Use.

What is copal oil and what is it used for? How is it obtained?

In the melting of copals, such as Manila and Kauri, when it is desired, regardless of cost and of the resulting color of the product, the temperature is raised to a higher point than is absolutely necessary to perfect a fusion of the gum with linseed oil, to give the varnish greater hardness and durability, also much mixability with pigments, a distillate, the so-called copal oil is driven off, the quantity of which depends upon the degree of temperature and the length of time it is subjected to such temperature and the natural hardness of the gum. The Manila gums yield much more oil than Kauri gums and Manila gum oil is heavier in specific gravity than the Kauri gum oil and much more aromatic, its odor being very penetrating. The oils from both gums are used in cheap rosin varnish-making, replacing the ordinary rosin oil, but their use is rather limited, because the varnish makers will not permit their distilling over, unless they have a special purpose in view.

The Chemiker Zeitung No. 73, of 1905, published the following data on copal oils, which show the wide divergence of the constants of the Manila oil from that of Kauri oil, which, however, is not really surprising when the respective hardness of the gums are considered:—

	Manila Copal Oil	Kauri Copal Oil
Specific gravity at 59° F.	0.9069	0.8677
Saponification number (cold)	45.7	4.9
Acid number	28.3	3.0
Ether number	17.4	1.9
Iodine number (by Waller)	230.4	288.9

It will be seen that the Kauri copal oil is very close to spirits of turpentine in specific gravity, yet it would have to be rectified to water whiteness before it would replace that solvent, and it is doubtful whether it would take its place in solvent properties. Experiments as to the solubility of the two oils have resulted as follows:—

Solvent employed, 95 per cent. alcohol; Manila copal oil, perfectly soluble; Kauri copal oil, dissolves readily.

Solvent employed, carbon disulphide; Manila copal, perfectly soluble; Kauri copal oil, perfectly soluble.

Solvent employed, carbon tetrachloride; Manila copal oil, perfectly soluble; Kauri copal oil, perfectly soluble.

Solvent employed, coal tar benzol; Manila copal oil, perfectly soluble; Kauri copal oil, perfectly soluble.

Solvent employed, amyl alcohol; Manila copal oil, perfectly soluble; Kauri copal oil, perfectly soluble.

Solvent employed, spirits of turpentine; Manila copal oil, perfectly soluble; Kauri copal oil, perfectly soluble.

Solvent employed, sulphuric ether; Manila copal oil, perfectly soluble; Kauri copal oil, dissolves readily.

Solvent employed, petroleum ether (benzine); Manila copal oil, precipitates; Kauri copal oil, partly soluble.

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Acaroid Resin in Varnish.

The usual trade name for this resin is acaroid resin or gum acaroids, but it is also known as Hanthorrhoea resin, black boy gum, grass tree gum, Botany Bay resin, earth shellac and nut resin. Its home is in Australia, where it exudes from certain trees and covers their trunks with a layer from three-fourths to one and one-half inches in thickness. There are two kinds of this resin, that known as acaroid being pale yellow, becoming somewhat darker, almost light russet with age, while the Hanthorrhoea resin is quite orange to reddish. The former resembles gamboge, the latter dragon's blood in color, but both are readily soluble in alcohol and are therefore best suited for use in spirit varnishes, where their respective color is rather an advantage than a detriment. The market price of this resin being almost on the level with ordinary rosin and much below the price of gum shellac and also below the market price of gamboge or dragon's blood; acaroid resin is preferable for use in spirit varnishes for use on metal, gold lacquers, brass lacquers, leather lacquers, etc., while the red resin is useful in sealing wax, soaps and coatings for India rubber articles. Acaroid resins are very permanent to light in comparison with gamboge and dragon's blood, therefore preferable also on this account. The foreign vegetable matter which is present in the reddish resin can be removed by filtering the solution or by settling.

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Refinishing Tarnished Brass Bedsteads.

The metal must be cleaned from tarnish, which is best done by mixing in a stone jar two parts of commercial nitric acid and one part sulphuric acid (oil of vitriol). Small parts may be dipped in this, then at once in clear water and rubbed dry with sawdust. Large parts are brushed over with the acid by means of cotton waste attached to a stick and the hands protected by rubber gloves, washed off immediately with clear water and dried with sawdust. This will leave the brass clean and of good luster and makes a good surface for lacquering. The method is in use in the United States arsenals. When the brass is not badly tarnished, but merely greasy from contact with perspiring hands, etc., a paste made from two parts rotten stone and one part soft soap, applied with a soft rag or brush, permitted to stay on the metal about one hour, then rubbed off with a dry cloth briskly and finally washed with clear water and the metal well dried with a cloth will serve equally well.

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Dead Black Matt Lacquer for Photographic Apparatus.

You can accomplish this by dissolving, say two ounces of borax in forty ounces distilled water, bringing the solution to a boil and gradually adding to the boiling solution, while constantly stirring, eight ounces of orange gum shellac, adding, when the gum is fully dissolved, one ounce of refined glycerine. According to the degree of flatness desired, you may add anywhere from four ounces to twelve ounces of finest lampblack to the solution, running the whole mass through a small mill; or if this cannot well be done run it through a coarse wire sieve first so as to break up the lumps, then through a sieve of finer mesh and finally through cheesecloth. Of course, the quantities given are to instruct you as to the relative proportions only of the various ingredients, and you can increase these according to the quantity required.

If you choose to do so you can use in the above in place of lampblack the water soluble aniline black, Nigrosene B.

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Cheap Enamel Varnish Without China Wood Oil.

While we cannot guarantee results, we give the following for what it may be worth:—Melt in a portable copper kettle 100 pounds N or W. G. rosin, according to the degree of paleness you wish to have the product. When your thermometer indicates a temperature of 125 degrees C. (equal to 257 degrees F.), add six pounds air slaked lime in small portions, stirring well in the meantime. When the mass, which is now very active, finally ceases to foam and rise to the top of kettle add twenty pounds bodied varnish makers' (oxidized or blown) oil, bring again to a boil for about fifteen minutes, remove from fire, let temperature go down to 150 degrees F. and add 100 pounds spirits of turpentine. Filter through cotton and clarify by settling.

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Formulas for Making Shellac Varnish.

When using denatured alcohol, see that you have that known as 188 degrees, as other kinds are not as good in solvent power. Wood alcohol for dissolving shellac is usually designated as 95 per cent. wood spirit. The latter is higher in price than the former, yet it is the denatured article which is least objectionable so far as the effect upon the operator's system is concerned. Whether you can make shellac varnish at a lower cost than you could purchase it from the

makers depends upon the cost to you of the materials, which again depends upon the quantity you can purchase at a time. Orange gum shellac is designated as D. C. for the best, V. S. O. for the next grade; then follow Diamond I, Fine Orange, Second Orange and T. N., and prices range accordingly. Bleached or white shellac can be purchased in hunks or bone dry, granulated, the latter form being best for your purpose.

Orange Shellac:—4½ pounds of gum as above; 1 gallon wood or denatured alcohol. Digest in a suitable mixing keg for large batches, or in a wide-mouthed glass jar for the small quantity given here. Agitate or shake the mixture occasionally until all the gum is dissolved. To hasten solution, keep in a warm place, or place jar in a warm water-bath. The batch noted above will produce one and one-third gallons.

White Shellac:—5 pounds bleached shellac; 1 gallon wood or denatured alcohol. Follow directions given for orange shellac. Keep the product in glass jars or earthen jugs, as tin is liable to discolor it. Some users call for pure grain alcohol shellac varnish, but manufacturers have given up the manufacture of such a product long since, as consumers will not pay the price it would be necessary to charge.

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Cause of Varnish Becoming Tacky After Apparent Drying

Reactions in the hardness of varnish are of frequent occurrence and happen mostly when applied in too heavy a coating or where several coats have been applied to a certain object and the second or third coat is given before the previous coat has had time to harden thoroughly. This applies to air drying varnish. In the case of the softening of varnish that has been baked and afterward become soft again the fault may be in the manner in which the baking (stoving) has taken place; that is, the upper surface was given a much higher degree of heat and baked hard, while the lower coating next to the metal was not hard enough. The composition of the varnish may be at fault. China wood oil varnishes that have been baked are more liable to become soft than linseed oil baking varnishes. China wood oil becomes hard by polymerization, which takes time, and the hardening of these varnishes must of necessity come from their interior. This process is interrupted when in baking the outer surface is hardened while the inner portion is still soft, for it stands to reason that the resins that are also part of the varnish require oxygen for their drying, and this cannot come in contact with the ingredients in question, being unable to penetrate through the baked crust. The solvents (volatile thinners) also play an important part, and turpentine is, after all, the best article to use in order to keep varnish from softening.

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Matt Lacquer or Varnish for Soft Wood.

Most any varnish that is reduced with sufficient turpentine will dry flat or dull on soft wood as a first coater. However, on second coat it will not dry flat enough, and it is necessary to add a hard wax that has been dissolved in spirits of turpentine to the varnish. It is best, however, for good work to purchase the flattening varnish from a reputable varnish manufacturer or supply house.

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Blooming of Varnished and Shellaced Surfaces.

A varnish had bloomed or become foggy a few weeks after it had been applied in a fine private residence. It was a long oil varnish and its restoration was sought.

The blooming of the long oil varnish may be caused in several ways. There may have been a condensation of moisture upon the surface before it was thor-

oughly dry and hard. If varnish becomes foggy after hardening, it can be brightened readily by going over the surface with a dampened chamois. But when the trouble is due to moisture and improper ventilation during the application of the varnish, the only remedy is to rub it down with pumice flour and water and applying a fresh coat of varnish after cleaning up and drying. The whitening of rubbed shellac finish is due to moisture, the dampness having more effect in some places than in others. The remedy is to apply heat without, however, scorching the finish in the milky spots, and when the life is thus brought back to the shellac finish apply at once a good interior rubbing varnish over all.

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Cheapening Shellac Spirit Varnish.

When shellac varnish is cheapened, the material used is usually ordinary pine rosin, and denatured alcohol, being lower in price than methylated spirit, is employed as the solvent. But we are not in the habit of suggesting fake methods to our readers and, therefore, will not recommend such. Where pale color is not an essential requirement, it is best to use lower priced gum shellac and dissolve it in denatured alcohol of 188 degrees, which is low enough in cost. Sharp white sand or powdered glass is used, when it is desired to cut gum shellac quickly, but it is not absolutely necessary to use it. When used, the sand must be bone dry, otherwise it will make the gum clog together. Four pounds orange or brown gum shellac and one gallon alcohol will make one and three-eighths yellow varnish. Strain through cheese-cloth, when dissolved.

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Reason for Cracking of Colored Spirit Varnish.

If spirit varnish is mixed with pigment colors and quite a portion of the latter used the cracking is readily accounted for. In that case five per cent. of thick turpentine is insufficient and one-fourth of the weight of Manila gum would not be too much. If varnish is colored with fat aniline products, however, then the trouble may be due to the fact that the first coat was applied too stout and did not enter the pores of the wood, or a second coat was applied before the first coat was hard. In the latter instance the first coat dried finally and disturbed the finish by contracting. The remedy is to add a small percentage of a fatty oil or linoleic acid, which, of course, makes the spirit varnish dry more slowly, but this cannot be avoided and yet have good results in wear.

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Water-Resisting Enamel Mixing Varnish.

Formula desired for a mixing varnish that can be successfully used in producing a water-resistant enamel paint that will not only resist water on the surface, but also resist moisture from back pressure of dampness in walls.

If we could furnish a formula that would give the results desired we should not care to publish it, as we would then be able to accomplish what are considered impossibilities. The chief requisite for an enamel paint to adhere to the surface on which it is applied is a perfectly dry and hard undercoating. If enamel paint is exposed to moisture from the exterior, it means that it must be composed of material that is able to withstand that influence to a great extent. A varnish of this character is described in a new handbook as follows:—In a varnish kettle of suitable size are melted, in the usual manner, twenty pounds Brazilian copal (Pontiak), to which is added five gallons heavy-bodied, fire-boiled linseed oil, the melt heated to 280 degrees C., then allowed to cool to 160 degrees C., when two ounces flour of sulphur and one and one-half ounces of paraffin are introduced and the whole agitated until all is dissolved. When this is accom-

plished, two gallons spirits of turpentine, seven ounces rubber solution, two gallons benzine and two ounces oil of myrbane are added.

The rubber solution is made by soaking twenty parts by weight of pure para rubber or caoutchouc in a similar weight of linoleic acid for three days, then adding the mass, little by little, in ten parts by weight of linseed oil heated to 160 degrees C. This temperature must be kept up until there is a complete solution. The pigment, generally zinc oxide or lithopone, is ground in this varnish to paste form on roller mills and then reduced to brushing consistency with the same varnish.

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The Origin of Hard Oil Finish.

We understand that this varnish was first placed on the market under that trade name some forty-five years ago by Berry Brothers of Detroit, Mich., and the name, not having been copyrighted, it has passed into commercial trade language. It became very popular from the start, because of its many good qualities in preserving interior woodwork, imparting a handsome, permanent finish at moderate cost. Nearly every if not all varnish manufacturers offer interior varnishes under this trade name and it is up to the consumer to discover, by trial, which particular brand suits best his purpose.

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Table Top Finish to Stand Hot Dishes.

A mission oak dining table finished with flattening varnish. Accidentally some ammonia was spilled on the top of the table, leaving white marks. A method of removing spots was sought.

The white spots are produced by the action of the ammonia on the varnish, and the latter cannot be restored by any means to its original effect. A neutral paint and varnish remover will remove all of the varnish quickly, and then, after wiping the softened varnish clean off from the top, a thin coat of mission oak stain should be given, and the finishing is best done with hard furniture wax. Mission oak is not supposed to be varnished, but either left without finish, very dull or with a thin coat of white shellac, sanded down lightly and then waxed with French wax polish. We do not know any finish for table tops that will equal the old-fashioned oil polish in standing the wear of hot dishes, but the method is too cumbersome and expensive.

—582—

Spar Varnish Crawling on Refinished Work.

The cause of spar varnish crawling between the first and second coat on a two-coat job, especially on a refinished door and on refinishing an outside door after the old varnish has been removed, the door having been partially bleached with oxalic acid and denatured alcohol, then varnished with two coats. In a short time the bleached spots show white through the varnish.

We think that the crawling between first and second coats on the two-coat job is due to the first coat not being thoroughly dry and hard, when second coat was applied. This may have been due to the slow drying of the varnish or undue haste in applying the second coat, or to the surface not being cleaned down in such a manner as to harden the first coat. Spar varnish, as a rule, is intended for exterior work, and in order to wear well, must be necessarily of slow drying nature. If spar varnish is used on inside jobs, it should be used only as a finishing coat over a first coat of hard drying inside varnish.

When wood is bleached with oxalic acid the use of denatured alcohol is not good practice, because the denaturant used retards its efficiency. Wood alcohol

is better for the purpose, but neither will remove the traces of acid in the bleached wood. Several washings with clear water and thorough drying out before the varnish is applied is the proper method. A better method of bleaching wood is repeated washings with a solution of 18 ounces chloride of lime and 2 ounces of soda crystals in 10 pints of water, followed with a wash of dilute sulphurous (not sulphuric) acid, and subsequent rinsing with clear water, which removes all traces of chlorine and does not injure the wood nor any paint or varnish applied after thorough drying.

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Ventilation in Varnish Rooms.

A man writes:—I am working in a small hardware finishing room and the room becomes rather crowded when a batch of the ware finished with flowing varnish is put up to drip and dry, causing the fumes to be so strong that I consider it dangerous to health, inasmuch as the ceiling is not high enough to let the fumes escape and windows and doors must be closed to exclude draught, in order to keep the varnish from crawling or creeping. Can you help us out in the matter? Am also using wood alcohol for cutting shellac, and I know it is hard on the eyes and injurious when inhaled. Can you advise a particular kind of respirator that might be of service when using shellac and the gloss flowing varnish, whose fumes are also extra strong, or do you know of anything I might add to the varnish without injury so as to overcome the fumes to some extent? Could I use grain alcohol for cutting the shellac, and of what strength should it be?

We do not know of any better way of expelling the fumes generated in the drying of the varnish, which, no doubt, is of a cheap grade, in which petroleum spirits of the rapidly evaporating type is used as the thinning medium, than to provide some ventilation at the top of the room. This need not be done by having the windows open at the top and thus create a draught, but each window could have an elbow-shaped ventilator, same as may be found in the offices in large buildings, which would let most of the fumes escape.

Respirators are more for keeping dust out of lungs than to serve as a protection for gases or fumes, at least we do not know of any particular type for the purpose. As to cutting gum shellac with grain alcohol, that is a thing of the past, as grain alcohol is subject to a heavy tax and shellac at the present time is exceedingly high in price also. Denatured alcohol has not the pungent odor, nor does it emit the unpleasant and poisonous fumes of the wood alcohol and that known as 188 deg. is best for cutting gum shellac.

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Using Up Old Thickened Varnish by Thinning.

How old varnish of good quality, that has become very thick by exposure and also rather gummy, can be treated to make it workable and useful.

This depends upon the degree of saponification. When the varnish has lost its volatile thinner and has become stringy and ropey, there is no process that will bring it back to life, without which it is not safe for use. Linseed oil, at any rate, no matter how highly heated, will not redissolve the resinified oil and gum. If not too far gone turpentine or benzine will take some action on the residue by heat, but it will hardly pay for the risk and trouble.

When varnish has simply thickened, to a certain extent, it can be made workable by placing the container in a hot water bath and heat up some turpentine or benzine in the same manner and to a like temperature, then mix by thoroughly stirring.

—585—

Composition of Bright Varnish Formerly Used on Wooden Ships.

The composition of bright varnish that was used on ships about forty years ago.

We have not heard of this material being on the market or being used during the past twenty-five years, but in the seventies and eighties of the last century, it was very largely used on craft in the coastwise trade for the decks, masts and spars and came from Southern ports, such as Savannah, Ga., Wilmington, N. C., and Charleston, S. C., and was largely sold in Northern ports through ship chandlers.

Its composition consisted of rosin, melted by heat in iron kettles, hardened by the addition of lime, made elastic with a portion of rosin oil and thinned with petroleum spirit (benzine). On account of its low cost, the fact that it was apt to turn white in contact with water did not interfere with its popularity.

—586—

A Shellac Substitute.

Correspondent refers to a substitute which has been placed on the market, that is made by adding chemicals to water rosin, which is afterwards cut in alcohol, and sometimes a small portion of shellac added.

If there is such an article on the market the consumers will find out to their sorrow that they have all sorts of trouble, and will discontinue its use before long.

As to the use of chemicals with water and rosin, there is absolutely nothing in the idea, as water and rosin do not mix, even with caustic soda or caustic potash, to such an extent that when cut afterwards with alcohol it will give any semblance to the stuff so produced that it will appear to be true shellac varnish.

There is no book treating on such a subject, because if any people had such knowledge they would keep it strictly to themselves. There has been a time when shellac varnish has been adulterated by adding a solution of rosin in benzine to the shellac cut in alcohol, but as to adding rosin and water, we have not heard of it.

Shellac gum at the present time being very high, there must be quite some practice of using part rosin in place of shellac, and it stands to reason that this will reduce cost considerably without fear of detection by the shop keepers, who are after cheap prices.

There is nothing in the water and rosin solution in connection with this problem, as that would dry too dead, even if gum shellac was added in appreciable quantities. Rosin cut with denatured or wood alcohol is the only available cheapener.

—587—

Material Used in Varnish to Make It Proof Against Boiling Water.

There is no ingredient or materials that can be added to any varnish in the cold way for the purpose named, but China wood oil, properly treated and used in the right proportion and in the right temperature, replacing certain portions of linseed oil during the manufacturing process, will produce the resistance to hot or boiling water. This, however, is a secret of manufacture that so far as we know has never been published in any text books, and its success depends entirely on the ability and caution of the manipulator.

—588—

To Make Varnish Dry Flat.

Take one gallon of hard oil finish or a good grade of furniture varnish and heat it to make it simmer. Into this, while hot, pour six ounces of melted

beeswax, that is still liquid and hot, stirring well, and finally two ounces of sweet oil. Take from fire and thin with three pints pure turpentine, previously warmed in a water bath. This will make one and one-half gallons, which should be filtered while warm through cheese cloth into tin cans, that can be corked tight after the mass has become cooled. Everything must be kept clean, and in applying the varnish lumps must be avoided. Use badger-hair brushes, laying off the work one way and feathering the other way. Work rapidly, as it sets rather quickly, but it makes a nice job. The sweet oil retards drying somewhat, but the addition of a little gold size japan will correct this.

—589—

Transparent Colorless Varnish for Marbleized Work.

Much depends upon the kind of work you intend to use it over, and what you can afford to invest as to cost.

For quick drying varnish dissolve five pounds bleached or white shellac, granulated, and two pounds clear Venice turpentine in sixteen pounds refined wood spirits (cologne spirits being entirely too high in price, and denatured alcohol rather slow to set). If the work is for interiors only and merely for the purpose of ornamentation you can get along with less expense.

For rapid drying dissolve ten pounds of W. W. rosin, powdered with two pounds crude turpentine in eight pounds 95 per cent. refined wood alcohol, while for slower drying dissolve ten pounds W. W. or W. G. rosin with two pounds crude turpentine, two pounds spirits of turpentine and six pounds 95 per cent. wood alcohol. Dissolve in earthen or glass ware, strain through several thicknesses of cheese cloth and keep in well stoppered glass bottles to keep from discoloration.

—590—

The Chief Causes of Trouble with Varnish Surfaces

Sweating is usually caused by varnish being applied to a surface not thoroughly dry, but may also be due to its containing too much oil for the portion of gum it contains. To remedy this give it all the time it requires to stop sweating.

Then rub it down with a soft cloth and a little flour of pumice, clean off thoroughly and apply another coat of varnish.

Deadening or flatting is usually caused by dampness, a porous surface or too much drier in its composition.

Alligatoring or turning white of varnish is due to a lack of oil and inferior grade of gum or ordinary rosin in its composition, especially when exposed to strong sunlight or moisture.

Blooming of varnish is caused by condensation of moisture on its surface before it has dried hard. Sunlight and dry air should be the remedy. Gas fumes and sudden changes of temperature will also produce blooming. Varnish that contains too much benzine or is cut with benzine is very apt to turn yellow. Mixing of different brands or grades of varnishes is liable to produce pockmarks.

—591—

What Will Replace Shellac Varnish in Natural Hard Wood Finish?

S. O. H., Minnesota, says:—Paste filler, shellac and to coats good varnish, rubbed with pumice and oil make a fair job. Is there anything that will take the place of shellac for such a finish?

Answer:—We don't think so; in our opinion the very best commercial grade of shellac as now made with the high market prices for gum and alcohol is none too good for good work. Many shellac substitutes or sealers have been tried and found wanting.

—592—

Why Does Varnish Crawl on Grained Surface?

It may be too high gloss or improper drying of the graining color or a greasy surface, or the fault of the varnish. Grained surface should be rubbed or mossed with pumice and water before varnishing.

—593—

To Keep Shellac Varnish from Gumming Up During Use.

If the varnish is of good body, thin it with denatured or wood alcohol sufficiently to work more freely, but do not overdo it, as the body of the varnish will suffer thereby and the filling properties as well.

A better way is to mix one pound of Venice turpentine or Canada balsam with enough denatured or wood alcohol to the same consistency as that of the shellac varnish, and add the resulting mixture to one gallon shellac varnish, which will make the varnish flow more freely, but make it set up and dry more slowly.

—594—

Caoutchouc and Gutta Percha Varnishes for Various Purposes.

In preparing caoutchouc (pure Para rubber from Brazil), purchase the pure article and cut it into thin shreds with a very sharp knife, which wet with water always for every cut you make, as that will facilitate the work. Dry the shreds or slices for several days in a temperature of about 120° F., as that will make the solvents act more quickly. While petroleum spirit, turpentine or hot oil will dissolve the rubber, their action is rather slow, the best being coal-tar benzole. Disulphide of carbon is most rapid, but rather dangerous to handle, both as to risk of explosion under certain conditions and subjecting the operator to nausea.

For use on leather, dissolve 1 part by weight of the rubber chips or shreds in 4 parts by weight of benzole and 4 parts of spirits of turpentine, and, when solution is complete, filter through cheese cloth and mix the strained part with 6 parts by weight of good elastic varnish and 4 parts by weight of double boiled linseed oil. For use by gilders dissolve 1 part by weight of rubber in 8 parts by weight of benzole, and after filtering add 4 parts by weight of gold size varnish. For making imitations of flashed glass dissolve 1 part rubber with 60 parts of chloroform by weight, and when rubber is dissolved, add 10 parts gum mastic by weight.

Gutta Percha Varnish for Coating Maps, Documents, Book Covers, etc.:—thoroughly dried gutta percha in 8 parts of siccative oil in a water bath, and mix the solution with 1 part of coal-tar oil (the light oil of tar) and 1 part of good elastic oil varnish. This can be colored with pigment colors, ground in drying oil, such as drop black, composite green, Prussian blue or maroon lake, etc.

Gutta Percha Varnish for Coating Maps, Documents, Book Covers, Etc.:—Cover 5 parts by weight of sliced and well dried gutta percha with a mixture of 25 parts by weight of light tar oil and 25 parts benzine free of water, 20 parts carbon disulphide and 10 parts of eucalyptus oil. Digest the mass by shaking occasionally, until the largest portion of gutta percha has been dissolved, then let it stand until clear and pour off the clear portion.

—595—

Dissolving White Shellac in Denatured Alcohol.

Granulated white shellac that has been in stock for a long time becomes almost insoluble, even in 190 proof cologne spirit, which costs five times as

much as denatured alcohol. White shellac is sometimes overbleached, which renders it very difficult to dissolve in spirits of wine of 96 degrees proof, while wood spirit will cut it much better. A method of insuring a more prompt solution is to put the granulated gum into a well stoppered, large flask and add sufficient ether to cover the gum. After corking the flask tightly, let stand a day or two, shaking the bottle occasionally, then adding the denatured alcohol in sufficient quantity; set it in a warm place or in warm water, shaking occasionally, until all is dissolved. So long as the shellac has been suspended in the alcohol without solution, we would advise that you pour off all the alcohol from the undissolved gum and then do as suggested; that is, cover the gum with ether, U. S. P. 1900, following above method, then return the denatured alcohol, that has been poured off, and follow the method above referred to, until finished.

—596—

To Keep Spirit Varnish Transparent and Free from Cloudiness.

A writer had trouble on account of his spirit varnish becoming turbid and spongy, and would be glad to hear of a method to overcome this.

Your trouble is due to the fact that when the alcohol evaporates it leaves a remnant of water, as alcohol contains more or less water, absolute or water-free alcohol never being employed in the manufacture of spirit varnish. To overcome this, it is best to cut up thin gelatine into strips and place a number of these in the varnish. The strips will soak up most of the water and the varnish will lose its turbidity, and the strips of gelatine can be used over in another batch.

—597—

Selected Formulas for So-called Oil Shellac.

Up to ten or fifteen years since we noted this material in paint and varnish manufacturers' price lists, but it appears to have gone out of the market or may be sold under another name. We do not really see much in this material, as the following formulas handed us will show. A prominent Western painter, now retired, says he used to manipulate his oil shellac as follows:—Four parts, by measure, of shellac varnish and one part gum spirits of turpentine are mixed and well stirred, when two parts of pure boiled linseed oil are added by thorough stirring. The shellac varnish must be of good body. Another party made his oil shellac by mixing one pound of gum shellac in powdered form and one and one-half gallons pure raw linseed oil, boiling the mixture until the gum is dissolved. Still another party suggests to boil together three-fourths pound of powdered gum shellac and one-fourth pound powdered borax in three pints of water until the shellac is dissolved. Use either orange or white shellac, as may be desired. For oil shellac add three pints of boiled linseed oil to the shellac solution.

HARDWOOD FINISHING.

—598—

Hard Wood Paste Filler.

Select the finest water-coated silex or silica. See that it is bone dry, or, if not, dry it by some means at about 120 degrees F. Mix together for natural color, say, one quart each well settled raw linseed oil, pale gold size japan and turpentine, and add to this quantity of thinners enough silex or silica to make it of the consistency of soft putty. About 18 pounds of silex will be required. If well and thoroughly mixed, it will not be necessary to run it through a mill. This filler may be improved in filling properties by replacing the quart of turpentine by a quart of a solution of pure beeswax in turps, the solution being made by dissolving four ounces beeswax in one quart of turps. For colored fillers the pale gold size japan may be replaced by a darker grade.

—599—

What Is Better Than Silex for Hard Wood Filler?

A painter asks this question and adds:—Can you give me a better formula than one-third each oil, japan and turps, for making a stiff paste with silex?

The best authorities on hardwood fillers assert that silex or silica, when prismatic or needle shaped in formation, is without a peer in the line of materials for filling the pores of the wood, while that of spherical form is not so good. But either of these is more reliable than cornstarch, chalk, clay or gypsum, as they are not so apt to pull out of the pores when once imbedded therein. We do not know of any material better suited to mix with silex or other mineral for a good working paste wood filler than three parts gold size japan, two parts boiled linseed oil and two parts turpentine. The resulting paste is thinned to the consistency of varnish with turpentine.

—600—

Wood Filler That Can Be Colored.

Twenty-five pounds silica finely ground, four pounds kaolin (china clay), three quarts raw linseed oil, three quarts turpentine japan. Grind up together, and if required colored, add yellow ocher, umber, red oxide or any other suitable pigment.

H. C. Standage.

—601—

Cheap Liquid Filler.

How can the clay be prevented from settling in a liquid filler made with china clay and gloss oil; also how can a filler be made that will give better satisfaction, yet cost no more?

A cheaper liquid filler than one made with gloss oil (otherwise rosin and benzine liquid) cannot be made. A varnish made from linseed oil, hardened rosin and benzine costs more than gloss oil, and what is there that is cheaper? As to the settling of the clay, it cannot be avoided; carbonate of magnesia, which would not tend to settle, could be used. This, however, will increase the cost, and it would require at least one-half pound to the gallon. The refuse from pipe covering made of asbestos and magnesia might suit the purpose. Argalite, a silicate of magnesia, once mined in the Adirondacks, has also filling properties, and pyrophyllite is another filling material of light specific gravity.

—602—

Oil Polishing for Table Tops.

The top of a very fine mahogany table had been badly marred by hot dishes, and the questioner was expected to remove the finish and repolish, using the French method of polishing.

The only polish that will stand the placing of hot dishes upon it without deterioration is the old-fashioned linseed oil polish. It is a simple method, but at the same time most laborious and difficult. All that is required is boiled linseed oil and a rubber made of a heavy block of wood to which has been nailed a piece of felt, or a piece of felt wrapped around a stone with a smooth, flat surface, say about three inches wide and four inches long and a few inches thick. Anything that has weight to relieve the muscles of the operator will serve the purpose.

The oil is applied to the surface moderately and rubbed in with the felt rubber until the surface is well filled and the oil has become sticky. Then it is allowed to rest for a few days, when the operation is resumed, and so on until a satisfactory polish has been obtained. For raw, unfilled wood, six to eight operations are required, while for repolishing three or four applications may prove sufficient. Neither the American varnish polish nor the French polish will give equal service.

—603—

Finish for Counters of Bar Rooms That Will Not Show White Marks.

A painter asked how to prevent the white spots that are caused by liquor on the tops of bar room counters. Has used shellac varnish for first coat and finished with a varnish said to be specially prepared for bar room counter tops to resist the action of liquor, but the white spots always appear in spite of this finish.

We have never known any varnish consisting of gum resins, oil and turpentine to resist the action of alcoholic liquors on table or counter tops. The only finish, so far known, to withstand this whitening successfully, is the old-fashioned oil polish, which, however, is tedious in the extreme. The method is a simple one and all that is required is plenty of patience, elbow grease and endurance. A coat of kettle boiled linseed oil is applied with a brush and this coat is rubbed until it becomes too sticky to rub further. The rubber should be a thick piece of felt, say four by six inches, which is fastened to a heavy block of wood on the sides, so that the tacks will not scratch the surface. With all the pressure both hands are capable of, it must be passed over the oiled surface in rotary motion. When the first coat has dried, another coat is applied, rubbed as before, and this operation is kept up until a good smooth surface is obtained, which requires from six to eight coatings. When the oil is drying a false top can be placed on the table or counter top, so as not to interfere with the business. When the proper finish is had, the tops should be oiled, for a time at least, once a month, when finally the coating will be so hard and heavy that renewing is required only at long intervals. As stated, the cost for labor by this method comes high, but the results make up for that in the long run.

George Schnied, a painter in Republic, Wash., writes:—"I have seen several ways to finish bar tops in *The Painters Magazine*, but they all take too much time. I finish mine in one day, and they look well and wear well if the tops are taken care of. I finished some five years ago and they look as good as ever. I give five, six or seven coats of shellac, either wood or grain alcohol; then rub with pumice and water. It takes more rubbing than varnish. Then polish with rotten stone. If done properly will be as smooth as glass."

—604—

Treatment for Maple Doors.

For natural finish of hard maple or bird's eye maple there is no filler required and it should be finished in its own color, that is, kept as light as possible by the use of white shellac, varnish for first and second coat and a very pale maple or ivory varnish for the finishing coat or coats. When hard, it may be polished with fine effect, but sandpapering is not required, unless the shellac varnish has not been applied evenly. Nor is sandpapering required on any kind of work that is treated with hard oil, unless the latter has become sandy from one cause or another.

Graining doors, etc., in imitation of maple needs much care and attention. The ground is a light cream tint, made with white lead and yellow ocher. The graining color is made of equal parts raw sienna and raw umber. Wipe out the lights that make the curl, and blend lengthwise of the curl. Varnish with a thin, pale varnish.

—605—

What Is the Best Interior Natural Finish for Georgia Pine?

As pine is very susceptible to finger marks from handling and from dust and will darken from exposure, the wood, in order to have it perfectly clean and smooth, must be sandpapered after coming from the carpenters or cabinet-makers.

As soon as it is cleaned and sandpapered until the surface is perfectly smooth, dust it and give it a coat of white shellac.

As Georgia or hard pine has a great deal of tar or rosin in it which comes to the surface on being exposed to the heat, and sometimes without, the shellac coat holds this back and also hardens the soft and porous grain of the wood and retards the discoloration of the wood with age.

Georgia pine is a close-grained wood and does not require filling, although for a first-class finish I would recommend a comparatively thin coat of light filler before the coat of shellac is applied.

After the shellac is dry, putty the nail holes with a white lead and whiting putty, colored with yellow ocher to match the wood. Sandpaper lightly the coat of shellac with about No. 0 sandpaper, dust thoroughly and apply the first coat of varnish, using a good grade of clear or pale varnish reduced a little with turpentine.

The amount of turpentine used depends on the painter and the materials he is familiar with.

When the first coat is perfectly dry and hard enough, and if it has dried free of dust, it should be rubbed lightly with double 0 sandpaper, steel wool or curled hair and properly dusted, when the second coat of varnish can be applied, using sauce without reducing.

Should the work require a rubbed finish or a polish, use three coats of varnish and rub the gloss of the finish coat down with pulverized pumice stone and oil or water, and then polish.

Georgia pine will take on a fine finish if properly handled and some fine effects can be produced by the use of stains.

Georgia or Southern pine after a time often shows up with small streaks and spots in the wood, sometimes whole boards look as though they were mildewed, which ruins the finish. This is mostly found where a board or casing is next to a damp wall or water pipes.

This can be remedied somewhat by properly coating the back of the wood before erection, at such places, with a coat or two of shellac; or if that is too expensive, use two coats of a hard-drying paint to make it moisture proof as nearly as possible.

All work should be perfectly dry and the temperature about 70 degrees Fahrenheit.

F. E. Holipeter, Detroit, Mich., M. W. Master Painters' Convention, 1905.

—606—

The Best Way to Finish Georgia Pine (Natural).

I find the best way to finish Georgia pine is to first clean off all dirt and pencil marks, and to sandpaper smooth all rough places, if there are any; then give one coat of grain alcohol white shellac.

Second coat:—Rub down smooth with pumice stone or sandpaper, and give coat of any good interior finishing varnish of light color.

Third coat:—Rub down to a surface, and give one coat of interior finishing varnish of light color, same as second coat, then leave it gloss, or rub down and polish, or leave it dull finish.

I find that any other filler that has or contains oil or wood alcohol will turn the wood dark in a short time.

John Theobald, past president of the International Association of Master House Painters and Decorators, asked:—Is there enough body there to rub with pumice stone?

Mr. Hopkins:—Well, you have to rub pretty lightly.

Mr. Theobald:—I don't think there would be enough body there to rub after just applying one coat of white shellac. Steel wool would be better.

Mr. Hopkins:—That should have been stated, after giving it one coat of varnish.

Mr. Theobald:—Mr. Holipeter coats the back of the wood before erecting in position with a coat or two of grain alcohol to prevent the dampness going through. I think a coat of white lead and linseed oil or a coat of mineral paint and linseed oil would be better than shellac on the back to prevent dampness. Where we have wainscoting we generally apply a coat of lead and oil or mineral paint and oil. I think you will get better service out of an oil color than you do out of shellac. We never use shellac on the back of any woods. We have a coat back of the finish that we put on any good house, and we give it a coat of oil paint, and after allowing ample time to dry makes a better surface out of it than we would out of shellac.

W. F. Hopkins, G. C. & S. F. Ry., Cleburne, Texas.

—607—

Crude Oil for Rubbing.

I don't approve of the use of water for rubbing, but use crude oil instead, and wash it off with naphtha when we are done rubbing. You can get a good finish with water, but the danger is that some of the water may get behind the moldings or the door or panel, and cause the wood to swell, and so throw the molding out of position. This cannot happen if you use crude oil, and you will get just as good a finish as if you used water for rubbing. Where crude oil might discolor the work, kerosene, or any other water white non-volatile petroleum spirit, may be used instead.

The Veteran Painter.

—608—

Bleaching Knots in White Pine Before Finishing.

It was desired to bleach the knots in white pine wood so that they would not show up so prominently when finished in the natural.

The only bleaching agent for wood we ever knew of is chloride of lime, but some time ago the Scientific American published the following recipe:—Dissolve 17¼ ounces chloride of lime and two ounces of soda crystals in 10½ pints of water. Into this solution steep the wood to be bleached for a half hour, if the grain of the wood is not affected too much by the treatment. In order to neutralize the bad effects of the lime and soda, the wood is then immersed in a solution of sulphurous acid to remove all traces of chlorine, and then washed with clear water. The sulphurous acid, which clings to the wood in spite of

the washing, does not seem to injure the colors or varnish that are applied. As you desire to bleach the knots only, we do not see that this recipe will help you in any way, especially if your wood is on vertical surface. If you are of an experimental turn of mind you might mix up some chloride of lime to a fairly stiff paste with water and apply to the knots in a piece of pine board, leaving it on for about thirty minutes, then remove the paste and wash with a little dilute sulphurous acid and clear water.

—609—

The Best Finish for a Hard Pine Counter Top.

Liquid wood fillers are used on account of cheapness in place of shellac varnish for filling soft woods like white pine, etc., but will not produce good results on hard pine counter tops. Hard oil finish, well made of good material, is a very good varnish for hard pine on ceilings, wainscoting, etc., but is not the best material for counter tops. In a first-class job is desired on hard pine, we would say that a coat of orange shellac should be applied next to the bare wood, to be followed by a first-class coach rubbing varnish and finished with either one coat of this or a good elastic coach varnish which could be rubbed and polished in the usual manner, if so desired, or rubbed down to eggshell gloss.

—610—

How to Fill and Finish Redwood.

See that the surface is well planed and smoothly sandpapered; add some burnt sienna to a good paste wood filler; thin the same with turpentine to the consistency of varnish, and apply it in the usual manner; wipe off the surface in from 15 to 20 minutes and let it stand at least 36 hours; then sandpaper lightly and dust off carefully. To do a first-class job two coats of good shellac varnish should be applied, sandpapering each coat with fine sandpaper. Now, it depends on the price paid for the work as to how many coats of rubbing varnish it should have. Less than two coats will not answer; four coats will give a better surface for polishing. Let each coat become thoroughly hard before applying the next, and when you have as many coats on as you can afford, rub the surface with pumice and water and wash off thoroughly; let it stand 24 hours; then rub with rotten stone and water; wash and clean off as before, and give it another 24 hours' rest; then polish with rotten stone and olive oil, and if you have used a good varnish you will have as good a job as can be done.

—611—

How to Finish Red Birch with Best Results.

Paste filler may be used on black or red birch, but it is not an absolute necessity, as it is rather close grained. However, many wood finishers prefer to use paste filler, especially when the wood has been stained to imitate black walnut or mahogany. In such case a light paste filler is stained to suit and applied, instead of shellac. Two coats of shellac varnish without using a filler will bring the surface into first-class condition for a good polish. For a first-class job, stain the wood to suit the taste, give two coats of shellac varnish and finish with good interior or cabinet rubbing and polish.

—612—

Finishing Hard Wood Mantels.

The work of finishing hard wood mantels is similar to that of finishing any hard wood furniture, and depends very much upon the quality of the goods and their selling price. To go into details, it would be necessary for us to know the

particular kind or the various kinds of hard wood to be finished, and, therefore, we can only give an outline of the ordinary practice. Assuming that the wood is white oak or mahogany, and that the mantel has passed out of the wood-worker's hands, it is thoroughly dusted and given one coat of the proper wood filler, a paste filler, thinned with turpentine to the consistency of varnish, applied in a full flowing coat, natural color in the case of light oak, stained with a little raw sienna and raw umber for dark oak and stained with burnt sienna for mahogany. This coat is allowed to set, say from fifteen to thirty minutes, according to its drying qualities, when the surplus filler is removed by rubbing with excelsior or hair across the grain, so that the grain and pores will remain perfectly filled. After thirty-six hours the filler should be hard enough to permit of sandpapering, which should be done with the grain, never in a rotary motion or across the grain. This done, the work must be again carefully dusted and examined to see whether it has been properly filled, and if not another coat should be given, or at least the defective places be touched up. Use No. 0 sandpaper to remove all particles of filler left on the surface, and dust again. Filler is required on all open grained woods, such as oak, mahogany, chestnut, walnut, ash and butternut, while it is not needed for close grained wood. It is essential to rub the filler well into the wood, and after a good flowing coat has been applied with a soft bristle brush and before it has time to set, but begins to show flat, begin rubbing it into the grain with a piece of leather fastened to a block of wood, while on round work use a long leather strap to draw back and forth around the surface. When the work has been filled and sandpapered smooth, apply one coat of bleached shellac varnish and rub down with No. 1 sandpaper to a smooth surface. For high grade work follow this with bleached shellac varnish, rubbing each coat, when dry, with curled hair and fine pumice, excepting the last coat, which, in case it is to be in high polish, rub first with pumice and water, then with rotten stone and water, and polish with rotten stone and oil. If high gloss is desired, flow on a coat of cabinet varnish and omit rubbing. If eggshell gloss is wanted, rub the last coat with pulverized pumice and raw linseed oil or crude petroleum.

The number of coats of shellac varnish or high grade rubbing varnish, which may be used in place of the shellac after the first coat and with the exception of the finishing coat, is determined by the grade of work desired.

For ordinary mantel work in hard wood, the shellac varnish can be dispensed with and two or more coats of hard oil finish or furniture varnish used instead, but each coat, with the exception of the last, should be haired or mossed, and the last coat treated as above.

—613—

Staining and Finishing Hard Woods.

What class of hard woods require staining and filling, what class is best finished in the natural and without filling, and the best kinds of filler to be used and how?

The hard woods requiring filler comprise ash, oak, cherry, mahogany, walnut, rosewood, ebony, birch and redwood. Maple, sycamore and cypress are best filled with shellac varnish, while the open grained hard woods referred to above should be filled with mineral fillers, the so-called paste fillers offered to the trade by paint manufacturers. These fillers are offered in light shade or natural, also in oak color and dark or walnut, and in mahogany and ebony. Or the consumer may purchase the filler in the natural and color it to match the wood or the stain. Whenever the wood is to be enriched by staining or one wood is to be stained to imitate another, as in the case of birch to imitate mahogany or of cherry to imitate walnut, the filler must be colored to match the stain. When the wood has been prepared by scraping, sandpapering, etc., and dusted, and requires staining, this operation is always performed before filling, and if the work in hand is interior wood finishing oil stains are best for the work in point of durability. They make the best foundation for the filler and by using them thinned sufficiently with turps or benzine can be made to stain fairly deep and dry

within reasonable time: The stains being dry and hard, the paste filler is thinned with turpentine to the consistency of thin varnish and applied in the same manner with a short, heavy brush, crossed and recrossed, so that the grain pores may be filled. The filler is allowed to set, but not permitted to become hard, then the surface is rubbed across the grain with tow, excelsior or shavings to remove the excess of filler and pack the pores. This done, the surface is rubbed over with a piece of soft-cloth and from twenty-four to forty-eight hours allowed for thorough drying. On very open grained wood a second coat of filler is often required for good work. When the wood has been filled to the satisfaction of the operator, the surface should be smooth sandpapered and carefully dusted before applying the first coat of varnish. It has been suggested that a good job of hard wood finishing cannot be had without applying a coat of shellac varnish on top of the filler, but we do not favor this, because with a fair grade of interior varnish shellacing is not required. As to imitating walnut on cherry, the stain is best made from Vandyke brown and burnt umber ground in oil, thinned with turps and japan drier. To imitate mahogany on birch the straight grained birch should be selected and stained with a mixture of burnt sienna, Vandyke brown and red lake for bright and burnt sienna, Vandyke brown and rose pink for dark mahogany effect.

—614—

Finishing Georgia Pine in the Natural or Stained.

Georgia pine formerly was used but very little in the United States, excepting for floors, but is finding favor of late for interior finish in some of the better class of houses. Yellow or Georgia pine, if well finished by the carpenter, does not need any filler, but simply a sealer to keep back the sap. And there is nothing better for this purpose than pale orange gum shellac dissolved in grain alcohol, pure and denatured. If you wish to stain the wood use a stain made up as you have described, apply it as thin as possible, wipe up when set sufficiently and let it dry hard. Then give a coat of shellac varnish, which distribute as evenly as possible. Smooth with sandpaper when hard enough and give two coats of cabinet rubbing varnish, permitting the first coat to dry hard before applying the second. If you desire to produce an eggshell gloss finish, rub the surface with fine powdered pumice, which place in a dish mixed with water, into which you dip your rubbing felt. Soak the felt thoroughly with water and then take up the wet pumice with it and apply it to the surface in long even strokes, using uniform pressure. Every once in a while wipe off the pumice from the surface with the palm of the hand and when there are no more glossy streaks or pinholes noticeable it is time to wash down repeatedly to remove all of the pumice. Use a soft chamois skin to wipe dry and then rub it over with a soft cloth and a little crude oil, kerosene or sweet oil, when you will have a soft velvety finish. Follow the same method for natural finish, omitting the stain and applying the shellac varnish directly to the wood.

—615—

Finishing Cypress to Represent Mission Oak and Antique Oak.

Cypress is about the best wood for imitating mission oak, provided it is sawed from the trunk in straight cut, so as to show a rather straight grain. The stain to imitate mission oak on cypress is best made by breaking up, say two pounds of ivory drop black in japan and one ounce of rose pink or rose lake in japan with one-quarter pint of hard oil finish or inside rubbing varnish, adding, while stirring, little by little, say one-half gallon of spirits of turpentine. Strain through cheese cloth and try the stain on a piece of the wood. If still too strong add more turps or benzine. Mission oak effects vary, some having a slightly greenish effect, other varieties a purplish black tone. In the former case omit rose lake and add a trifle dark chrome green to the black. If you wish

to use a filler stain first and when dry use a very dark, nearly black, paste filler. Finish as desired with varnish rubbed or with flatting varnish or with wax. To imitate antique oak the stain should be made from say two pounds Vandyke brown, one pound raw Turkey umber and a little ivory drop black, all ground in japan, thinned with say one-half pint varnish, and one gallon spirits of turpentine in the same manner as for mission oak. As to matching the wood-work of the room to the furniture of mission oak, remove the old finish to the wood, then stain.

—616—

Fuming Hardwood Finish in Dwellings.

How is liquid smoke procured for use in darkening hardwood before it is filled and finished?

What you refer to we take to be the process of darkening wood by fuming with the vapors of ammonia. Only wood with a large percentage of tannic acid, such as oak, can be darkened by this process. It has the advantage over all other methods, because it does not raise the fiber of the wood, but leaves it in its natural condition. If the objects are small, use an air-tight case into which place the articles in a raised or elevated position, while in the bottom place a number of shallow dishes, filled with ammonia of 26 degrees Be. If the wood to be fumed is in place in a room, close the room tightly, stopping up keyholes and crevices with paper and place large dishes of ammonia of the degree mentioned on the floor and keep the room closed over night at least. When the wood has darkened sufficiently open doors and windows, giving the room a good airing, permitting all vapors to disappear. The color of the wood will be found uniform and sandpapering can be dispensed with. Fill with paste filler or shellac varnish according to the effect wanted or simply finish with wax.

ENAMELS AND ENAMELING.

—617—

First Class Enamel Finish.

The following method for producing the best grade of enamel finish is given us by a painter who does some of the finest work in New York city. The wood is first to be primed with pure white lead, thinned with three parts oil and one part turpentine. The next three coats are made by "stripping" or drawing off the oil from zinc white by thinning it with turpentine and allowing it to settle, and pouring off the liquid from the pigment. The stripped pigment is then mixed with damar varnish, that is used as a binder. If the work is to be tinted, make the first zinc coat several shades deeper than the finished work, lightening up on each succeeding coat.

The fifth coat is a color-and-varnish coat. For white work zinc white would be used, mixed with any first-class white or colorless varnish, specially made for enamel finish. If a tint is required, the zinc white should be tinted to the proper shade before mixing with the varnish.

The sixth coat is of the above varnish with just enough color in it to tint the varnish. The work is now ready for rubbing, which is done with pumice and water, followed with rotten stone and water. This produces a dull or egg-shell gloss. If a polish is wanted, further rubbing is required with rotten stone and sweet oil. If properly done this will produce a durable finish that cannot be excelled.

—618—

Interior Enameling Over Old and New Surfaces.

How are the leading painters of the large cities bringing up their work for a first-class enamel finish? That is, where they use a prepared enamel finish for either flat, eggshell gloss or high gloss effect, and where the new surface consists of such woods as poplar, white or yellow pine, etc., and on old work, that has been painted flat or in gloss with oil paint, or where the wood has been stained or grained and varnished.

One of the most experienced master house painters and decorators of New York stated in an address before a master painters' convention several years ago that a real good job of enameling in white in the best finish on new work cannot be done in less than eleven-coat work, and that at no time would he submit a bid on work of this character when the specifications call for less than nine coats. He described his methods fully, showing five or six coats of oil paint and flat coats being required to bring up the surface upon which to build up for the enamel, then three coats of zinc white in damar or white enamel varnish, then one or two coats white enamel varnish to be rubbed, and finally one coat of white finishing varnish, this to be polished to a velvet or satin finish or left in high gloss. The foregoing is simply given to illustrate what is considered necessary for perfect work of that character. Generally, however, the painter is obliged to follow the specifications of the architect or owner, and these vary to a great extent. It is very seldom that more than a total of five coats are given on new work and less than that for old surface, especially when the finish is to be a ready-made enamel of some kind of manufacture. A certain manufacturer of white enamel finish recommends for new woodwork one coat of shellac and six coats of his finish, the last coat to be rubbed with either pumice and water or rotten stone and water to a fine finish, or left in high gloss, as may be desired. We do not advocate such a method, believing that with the eventual shrinking of the wood the surface will soon show cracks. The proper method, which is followed by the best painters and decorators and which is embodied in most specifications for new work, is for new wood, one coat of white shellac varnish, no matter what wood it may be, one coat primer, made

from pure white lead in oil, thinned equal parts raw linseed oil and turpentine with a trifle oil and turps drier added. After forty-eight hours another coat pure lead in oil thinned with one part raw oil and two parts turps and a little drier. After from twenty-four to forty-eight hours more, according to conditions of temperature, a third coat of pure lead in oil, thinned with a little drier and pure spirits of turpentine only. When dry and hard enough this coat should be lightly sanded with glass or flint paper or fine steel wool, after which the enamel may be applied in two coats, or still better, one coat of best zinc white, ground in damar varnish and thinned with turpentine only, may be applied, and one or two coats of prepared enamel on this for the finish. If ready-made enamel is undesirable and a flat surface or finish is required, two coats of zinc ground in damar thinned with turps and a little damar varnish for first coat and with turps only for the final coat will give best result. For eggshell gloss some damar varnish should be present in either coat. For a velvety finish apply full gloss coat and rub down as stated. If the enamel finish is to be in tints, use coach colors to produce the desired tint with the white enamel, and tint the groundwork to the same tone and depth as the finish. Always putty up nail holes and other imperfections after the primary coat of lead and use only pure white lead and whiting putty in order to prevent shrinking and sweating out. To bring up the surface for enamel on plastered walls (new work), prime the wall with pure white lead ground in oil and made rather thin with three parts raw oil and one part turps and a little drier. Putty on this, if required. Then if you wish to save in number of coats give over the lead primer a coat of lukewarm glue size, made from good gelatine glue, or in place of this, a thin coat of good wall varnish. When dry follow the same method in number of coats and material as for new wood. For enameling over old painted or varnished surfaces on wood, it is best to ascertain first whether the paint is still firm and not too badly cracked, for if so the old paint and varnish must be removed clear to the wood. If varnished and still in fair condition, the gloss should be **knocked off** with sandpaper or steel wool of the proper grain, the surface carefully dusted and a groundwork for the enamel built up as follows:—If the old work be stained or grained in dark colors and the enamel finish is to be white, there will be a decided saving in the number of coats required if the first coat be tinted with lampblack to such a depth of lead color that the old paint will be completely hidden from view on the drying of this first coat, which should be composed of pure white lead in oil, tinted with a trifle lampblack in oil and thinned with one part raw oil and two parts turps and a little drier; the next coat to be of similar composition, but with less lampblack, so as to be nearly white. The third coat should be clear white, thinned with turps only, when the finish is to be white, but tinted if the enamel is to be a tint. In the case of old plastered walls that have been painted and where it is desired to refinish the same in enamel, the surface should be examined on its firmness, all cracks cut out in the ordinary way and filled with calcined plaster; the walls, if otherwise good, washed down with soapsuds and water, to which a little ammonia has been added, rinsed with clear water, and, when dry, proceeded with in the same way as in the case of old painted wooden surfaces.

—619—

Specification for a First Class Enamel Finish.

See that all woodwork is well smoothed and without defects. Then prime with lead, adding a small quantity of ocher to slightly color same, reducing it to proper consistency with one-third raw linseed oil and two-thirds spirits of turpentine with sufficient drier.

Second coat. Rough-stuff the entire surface, filling and smoothing all defects in woodwork, and rub down to an even and smooth surface.

Third coat. White lead mixed with three-fourths turpentine and one-fourth boiled linseed oil.

Fourth coat. White lead mixed with five-sixths turpentine and one-sixth white varnish.

Fifth coat. Half and half white lead and green seal French zinc mixed with three-fourths turpentine and one-fourth white enamel varnish.

Sixth coat. Zinc as above mixed with three-fourths turpentine and one-fourth enamel varnish.

Seventh coat. All French zinc mixed with three-fourths enamel varnish and one-fourth turpentine.

Eighth coat. Enamel varnish with zinc sufficient to color the varnish and a very small quantity of turpentine to make enamel work freely. Sandpaper between each coat to be done with very fine sandpaper or hair cloth. The first four coats to stand not less than three days between coats and the last four coats to stand not less than six days between each coat. All to be rubbed with pumice stone and water to a dull finish and if a high polish should be wanted, polish with rotten stone and water after pumice stoning.

If woodwork should be of pine or any other sappy wood, give it a very thin coat of grain alcohol shellac after first coat.

California Convention, 1908.

—620—

White Enamel Paint for Use in Bath Tubs and Interior Work.

A white enamel paint that will wear well on interior wood and wall work must not be expected to stand well on bath tubs, because of the great wear and friction it is subjected to in the latter instance. The manufacturer who looks toward earning the reputation of supplying the best bathtub enamel it is possible to make, rather than to unlimited sales, will grind the white pigment (usually zinc white or white lead and zinc white) in the best and palest hard gum varnish and a small portion of turpentine to the consistency of a soft paste, which is then reduced with white enamel varnish, a varnish prepared from part damar and part very palest kauri or Zanzibar copal, with pale linseed oil and turpentine to the consistency desired for brushing. A painter who desires to prepare a bathtub enamel of this quality may take eight pounds of the best French zinc white, ground in damar or other white varnish, break this up in one-half pint of pure turps, then add gradually, while stirring, one-half gallon of best white enamel (not damar) varnish, and one gallon of the highest grade bathtub enamel paint that will stand hot or cold water, as well as scrubbing with soap and water for a long time, will be the result. But no one need to expect that even this enamel will be able to withstand the usage given it very often by ignorant servants, the sliding along in the bottom of the tub of basins and pails or the scrubbing with sand soap. When a bathtub is composed of cast iron, the groundwork for the enamel should be one or two coats of white lead in oil, nearly flat. If the lining be copper, all grease, etc., must be removed and the surface wiped perfectly dry with clean waste; then a thin coat of shellac varnish and a coat or two of flat white lead paint must be given, on which the enamel will take a good hold. Tin lining is prepared by washing with dilute aqua ammonia, rinsing and drying, following with one coat of half flat white lead paint, while a lining of sheet zinc should be freed from grease and then treated with the following solution:—One ounce each chloride of copper, nitrate of copper and sal ammoniac are dissolved in one-half gallon of water, using a vessel of glass or earthenware. When all is dissolved, add one ounce of commercial muriatic (hydrochloric) acid and apply with a flat brush to the zinc lining. The zinc will blacken, but on drying out in about twelve hours there will be a thin gray film all over the zinc, on which any white lead paint will adhere firmly, making a good foundation for the enamel. The reason that the painting of bathtubs fails so signally in most instances is to be looked for in the fact that housekeepers seem to be of the opinion that for a very small outlay in money they should have service equal to the porcelain-lined article.

The preparation of a good all-around white enamel for interior decoration is comparatively simple, depending entirely upon the selection of the pigment and the proper varnish. To prepare a white enamel that is not to be rubbed or

polished, and that must be low in cost, zinc ground in damar varnish and this thinned with a pale mixing varnish, slightly blued, will serve the purpose. White lead should not be employed as base for interior enamel, as it becomes yellow; eight to nine pounds zinc white, ground in damar varnish, thinned with a half pint of turpentine and one-half gallon palest mixing varnish, makes one gallon of paint, weighing from twelve to thirteen pounds per gallon, the cost depending on the price paid for the varnish principally. A high grade white enamel that can be mossed, haired or rubbed and finally polished to produce a soft, velvety effect, is made from eight pounds highest grade French zinc in damar or white enamel varnish and reduced for spreading with a small portion of turpentine and about one-half gallon of the very palest rubbing varnish, making one gallon of enamel.

—621—

Enamel That Will Stand Hot Water.

A good enamel paint which will stand scalding hot water without softening or peeling was asked for.

Such an enamel can be made in white by grinding best zinc white in a pale hard gum varnish to impalpable fineness in soft paste form and reducing it to brushing consistency with a similar varnish. Only varnish made with bleached linseed oil from the palest grade of Kauri or Zanzibar copal and thinned with pure spirits of turpentine will serve the purpose, and the coating must be thoroughly hardened before the hot water is permitted to come in contact with it.

—622—

Permanent Inside Gloss White.

There is quite a demand in Connecticut for a glossy inside white, one that will stay white and retain its gloss. Must damar varnish be used in order to get gloss?

There are some very good inside gloss whites or white enamels on the market, but as they all, more or less, depend for their whiteness and gloss upon the varnish, and are, therefore, semi-transparent, in order to admit of free working and leveling. It stands to reason that it depends very much upon the whiteness and nature of the ground on which they are applied, whether they show up on drying a true and pure white. Nor will any interior white that contains a liberal proportion of oil in its varnish vehicle hold its whiteness for any length of time. The best and purest zinc white, ground in damar varnish and thinned with palest white enamel varnish to the proper flowing consistency, applied over a ground of zinc white in damar varnish, thinned with turpentine, so as to dry with eggshell gloss, will best serve the purpose.

—623—

To Make Enamel Stay on Sheet Zinc Lining.

How would you treat a zinc lined room that is to be used as a shower bath, so that white enamel paint will stay on the metal for good?

There are various ways to accomplish this result, one of them being to coat the sheet zinc with a priming of zinc oxide in oil, thinned with turpentine, and as soon as this has partially set, rub it with lump pumice, so as to mix the metallic zinc with the zinc oxide paint, and let it dry hard before giving the priming another coat. But there is another method, that never fails, when properly applied to either sheet zinc lining or to galvanized iron, as it gives a mordant on the metal, upon which most any paint will hold firmly. Make a solution of one ounce each of copper chloride, copper nitrate and sal ammoniac, in one-half gallon (about four pounds) of soft water, and when all the salts are

dissolved, add one ounce of commercial hydrochloric (muriatic) acid. The solution must be made in an earthen crock or in a glass bottle, as a metal receptacle will precipitate the salts and weaken the solution. With a wide, four to six inch, soft wall brush apply this solution to the zinc lining uniformly without missing a single spot. The zinc will turn black at first and, on drying, the solution will produce a gray film, upon which any oil paint will obtain a firm hold. In about twelve hours after applying the solution, the surface is ready to receive the priming or ground coat, which should be flat or egg-shell gloss and may be made from a mixture of lead and zinc in oil, or from zinc in oil alone, thinned with turpentine.

—624—

White Enamel Finish on Galvanized Iron.

A Minnesota painter wanted information on enameling galvanized iron and obtaining a perfect white effect in four coats. The first coat must be non-corrosive. He has used lead for first coat, but is now using zinc in oil, which does not cover so well, and when used stout enough works poorly.

We see no reason whatever why a good white ground cannot be obtained for your prepared enamel finish, so long as you can apply four coats in all. In the first place, your galvanized iron should have a wash in order to keep your paint from peeling, which is invariably the case when galvanized iron is painted with an oily first coat, especially if the painted metal is exposed. Full directions for preparing this priming coat will be found in the foregoing section. When your galvanized iron has been so prepared, make your first coat of pure white lead in oil, thinned with a mixture of one-third each raw linseed oil, pale or white japan and turps. Second coat, equal parts white lead in oil and zinc white in oil, thinned with turpentine only and enough white japan to hasten drying. For third coat take best French zinc ground in varnish, thin with pure turpentine only, and add a very little ultramarine blue to overcome the yellow tinge from the varnish. This coat should be nearly flat or have a faint egg-shell gloss at most and upon it the prepared enamel should give a perfect white finish.

—625—

Enameling Galvanized Iron in White by Baking.

How can galvanized iron be enameled in white by baking, so as to make a perfect job and not to have the solder, which holds certain pieces of metal to the iron, melt on baking? French zinc is desired to be used in making the enamel.

You need not be afraid of the solder melting in the baking process, as you cannot bake white enamel at a heat of over 180 degrees Fahrenheit without discoloring. Even at such a low temperature you cannot introduce white lead in your enamel, and therefore French zinc is the best pigment to be employed. In order to obtain a well covered job you will have to apply several coats and bake each coat for several hours. Your varnish must be very pale or discoloration will result at any rate. In order to make the enamel adhere well to the metal, the latter must be well cleansed with a soda solution, rinsed and dried.

—626—

Enameling Iron Bedsteads—Use of Baking Enamels.

Information was desired as to the use of baking enamels in the manufacture of iron bedsteads.

Baking enamels on metal work that is subject to such wear as bedsteads are not applied directly to the metal, as one coat of enamel is insufficient to cover up well enough, and two coats of enamel too expensive. Therefore, when the metal parts of iron beds are well cleaned, to free from dirt and grease,

which can be done in a soda water bath or benzine bath, they are primed, which is usually done by dipping in a suitable trough, vat or tank of the proper size, so constructed that the priming paint can be kept in suspension by mechanical stirring. The priming paint is usually zinc oxide in oil, which is thinned with a very thin benzine varnish. On account of the subsequent baking there must not be much oil in the priming; it should depend for its elasticity on the varnish thinners. This priming should dry nearly flat, at least with not more than eggshell gloss, and become hard in from six to eight hours in the ordinary temperature of the room. It should have body enough to cover well in one coat, so as to hide the color of the metal. Any little lumps that may appear on the parts after this treatment must be knocked off with sandpaper, and any places that are marred by handling or abrasions must be touched up with the brush, using the primer with more drying medium, so as not to delay too much. The next step is that of applying the baking enamel. A dust-free oven with ventilation must of course be provided, and steam radiators are best for heating it. For white enamel the temperature should not rise over 180 degrees F. at any one time, and the baking process is carried on for from four to six hours. For black enamel, the heat may rise to 250 degrees F., and the time is six hours. The grade of baking enamel is selected according to the quality of the product to be turned out, selling price being an important factor. We should advise you to put yourself in communication with any reliable paint and varnish manufacturers, who will, no doubt, gladly furnish you with the goods required, as well as with advice, how best to manipulate and apply the same.

—627—

Japanning Hooks and Eyes in Black.

The usual method is to immerse such small articles in a bath of black baking japan and place them on trays with wire sieve in bottom to drain. When well drained they are placed in a suitable oven and subjected to a heat of 300 degrees Fahrenheit, or over, for several hours. The black japan in this case is made from pure asphaltum gum, boiled linseed oil, and turpentine, with perhaps a portion of benzine. Any reputable varnish maker can supply this japan in the consistency required for the purpose. The principal feature is that it should drip freely and yet produce a fair gloss after baking.

—628—

Enamel for Metal to Imitate the Bluish Color of Steel Bars.

A formula was wanted for making a steel colored enamel for iron, one that will produce the bluish color on bars of steel. Must dry fairly quick and be waterproof.

Dissolve five pounds powdered bleached shellac in three quarts of 95 per cent. spirits of wine by maceration; also dissolve one pound of borax by heat in two quarts of water, and when the solution is complete and while boiling add, while constantly stirring, the borax solution, the alcoholic solution of shellac. Stir until there are no more lumps in the mixture, then add one-half ounce of methylene blue, which has been dissolved in sufficient alcohol. If a light color is desired, try first only one-quarter ounce of blue, adding more if required. Paint with a soft brush on the metal, which has previously been made bright with emery paper. The enamel can be removed at any time with a rag soaked in wood alcohol or acetone. If kept in well stoppered bottles or sealed cans the enamel will keep indefinitely.

—629—

Enameling the Rough Outside Surface of Cast Iron Bath Tubs.

To produce a level surface you require an iron filler, such as is used on gas engines, of a color that is close to the finish you wish to apply. This filler must

be of putty-like consistency, so that for very rough places you can apply it with a wide spatula, and thinning it somewhat with turps, like an iron safe plaster to less rough surface. This filler must be of such a nature that when applied heavy it will show no cracks, and yet have enough binder so that it may be rubbed with pumice. It must also sandpaper freely in from six to eight hours. When the surface is so prepared, any good grade of engine enamel will stand the action of hot water very well, because the outside of a bath tub will never become as hot as the cylinder of an engine

—630—

How the Settling of Enamel Paint May Be Prevented Without Impairing Drying Quality.

Not knowing the composition of your white enamel, it is difficult for us to say what you should use to keep it in suspension. Enamel paints that are well made, as a rule, do not require frequent stirring and do not tend to settle to any extent in the can or other package.

The rapid settling may be due to the use of one or more pigments of heavy specific gravity, such as white lead and barytes or lithopone, or it may be due to the use of varnish of light body. In either case, the remedy is to add a pale varnish of very heavy body, which you know to be a quick drying medium.

If you make your own white enamel and intend it for interior work only, use the best French zinc, ground in damar varnish, break up the paste to the consistency of flour paste batter with turpentine, and add sufficient of the best white enamel varnish obtainable to make a free flowing paint of good gloss. To make one gallon will require one ten-pound can of French zinc in damar, less than one-half pint turpentine and about one-half gallon white enamel varnish. In every case the enamel should be strained through a fine wire sieve or through cheese cloth. Enamel paint made on this plan will not settle readily and may be rubbed down with pumice and water in 48 hours, or with pumice and crude oil in from 72 to 96 hours. For exterior work, a first class white enamel of great durability can be made by using equal parts of flake white in japan and French zinc ground in damar, thinning in similar manner, with the exception that the varnish employed should be a very pale outside varnish.

—631—

Repainting Bicycles with Air Drying Enamel.

As the cyclists do not give the repairer much time, we do not think that air drying enamel will answer, because if made to dry too rapidly and hard, the paint will chip or scale at the lightest touch, while, on the other hand, if made to dry slow enough to remain elastic, the paint will be come tacky or at least be too soft to be of good service. Bicycles, like carriages, often become splashed with mud, which, in many cases, is allowed to dry hard, and then takes some scrubbing to remove. This is not good for air drying varnish paint, because road mud has usually caustic properties, which will destroy paint, unless it is well baked on the enameled article. Most repair shops, therefore, as well as the factories, have their bake ovens and bake every coat from six to eight hours at from 200 to 300 deg. F. At a certain repair shop known to the writer the work is done as follows:—The frame is first cleaned down by burning off the old enamel, then sandpapered smooth and washed with gasoline, then placed in the oven for six hours to burn off any remaining grease, taken out again and washed with gasoline. When the first coat of enamel is applied it should be allowed to set, and then baked for six hours at about 250 deg. F. When cooled, it should be rubbed down with steel wool. The finishing coat should be baked for eight hours at 200 deg. F., and then rubbed down with a soft rag, then the varnish applied and baked eight hours at 200 deg. F.

The frame must be allowed to heat and cool gradually, because the enamel is soft when hot. It is best to apply the enamels with soft brushes and give 300 deg. F. for black, and 200 deg. F. for colors, while white should be baked at between 170 and 180 deg. F.

—632—

Enamels to Stand Baking at High Temperatures.

How baking enamels are made, especially black, also the composition of black that will stand 800 degrees F.

To answer you fully about the preparation of baking enamels would fill a good sized volume. We can only say that the proper pigments must be incorporated with fairly elastic varnishes of extra good body and that the enamels are flowed on heavily for that purpose over a proper ground or first coat that is also baked on the metals, but which is not so heavy bodied. A good lustrous black baking enamel that will stand from 250 degrees to 300 degrees F. can be made by first grinding a fine ivory black in varnish, then thinning the paste so prepared with an elastic varnish made from hard gum that would not dry in ordinary temperature in less than 60 hours. We do not know of any black paint that will stand a temperature of 800 degrees F. without burning off in a very short time.

—633—

Enameling Bathroom Outfits Made of Ordinary Fire Clay.

To paint bathroom outfits, such as bathtubs and lavatories, made by moulding same from fire clay and burning in kiln without glazing or enameling.

You will have to apply at least two coats of white paint made to dry flat to the surface before you can obtain a finish that will stand out with a fair gloss. These coats are required to stop the suction in the burnt clay and give the finishing coat a proper hold and the smoothness required. You can make the flat coats with lead and zinc in oil, thinning the paste with benzine, adding sufficient drier, or you may use one of the so-called combination leads, thinning as above. There are also flat drying, ready mixed whites on the market that are well suited to the purpose. In order to make a good job it may be found necessary to sandpaper the second coat, when dry, in order to give a fine finish to the enamel. As for the finishing coat or enamel, the best plan would be to purchase a good white enamel from a reputable firm of manufacturers, that can be bought at reasonable price, ready for use, as it will cost you more in the long run to prepare it yourself. But should you dislike to do so, you can purchase zinc white ground in damar varnish, paste form, and thin it to suit your own ideas with any good pale enamel varnish. The work must be done in a very warm room, where the temperature should not be below 75 degrees Fahrenheit, if possible, even higher. Better results could be obtained by using a baking enamel, to be baked after application in an oven at 150 degrees Fahrenheit.

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Weatherproof or Marine Enamel White.

How a first-class weatherproof or marine white enamel can be made, regardless of first cost. One that will set dust free in from eight to ten hours and dry hard under normal conditions in twenty-four hours and yet wear well, retaining its luster under severe conditions at least eight months and leave a fair surface for repainting next season.

The specifications are somewhat difficult to fill, inasmuch as a varnish, which is the principal ingredient of such an enamel, that will dry hard in twenty-four hours will hardly give the proper wear under severe conditions of exposure, that

you are desirous of obtaining. However, grind the best grade of French zinc white in a pale boiled oil of heavy body, to which some white sugar of lead, ground fine, has been added, say ten ounces to every one hundred pounds of the dry zinc used; the varnish may be of the thirty-six hour variety, so long as it is made from the palest kauri gum. To produce ten gallons of such enamel we should figure on fifty pounds of the zinc white paste in oil as described above, thinned with one-half gallon spirits of turpentine and seven gallons of white finishing varnish of the quality mentioned. If blueish white is desired, use ultramarine blue, ground in oil or varnish, mix all thoroughly and strain through a fine mesh wire sieve or paint strainer.

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Causes of Enamel Cracking.

There are several causes, the most frequent one being imperfect ground work. If the ground is too oily and has not had time to harden thoroughly, the enamel finish in drying contracts and the film parts in the form of alligator skin. When the ground is fairly flat, but not thoroughly hard and the enamel finish applied over it, there are liable to be fire cracks, which are fine like hair and are in the form of squares, triangles and circles. The form of cracks, usually termed alligatoring, are also caused by coating lumber not well seasoned, but in such case the cracks show through the ground coats as well, extending clear down to the bare wood. Then again, if the groundwork lacks elasticity, the enamel finish is also liable to show cracks, especially if the wood work shrinks from the heat in the rooms. The only other cause that we can assign for cracking might be in the quality of the enamel, when made from inferior material, or when, as has been done, it is applied directly to the bare wood without proper groundwork.

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Enamel Paint for the Interior of Refrigerators.

What white enamel paint is best adapted for coating the interior of ice-chests or refrigerators?

Whether the lining is of sheet zinc or of galvanized iron, it is best first to treat this lining, unless already oxidized by use, with a wash made from one part by weight of copper nitrate, one part by weight of copper chloride, one part of sal ammoniac in sixty-four parts by weight of water, to which is added one part by weight of hydrochloric acid. When this wash has dried remove with a duster the layer of dust on the surface, then apply your enamel paint, which should be composed of pure zinc white ground in white varnish and reduced with white varnish to brushing consistency. A good so-called white enamel varnish is superior to damar varnish for the purpose. Let one coat become hard before applying another. Do the work in a warm but well-ventilated room. Keep the doors of the chest open until the enamel has become hard throughout, and do not use the chest for storage until every vestige of paint odor has disappeared. To accelerate this, cut up a few large onions in slices and place these in the compartments on a dish. When the onions have become discolored the odor of turpentine will have disappeared. By using a white spirit lacquer the work of coating the interior lining of chests may be hastened, because the odor will disappear as soon as the spirit in the lacquer has evaporated. Such a lacquer can be produced by triturating best zinc white in alcohol and then mixing it with a solution of pale gum, such as sandarac or white shellac in alcohol, adding from five to ten per cent. of the weight of the gum of thick or Venice turpentine to make the paint flow more freely from the brush. The liquid for the spirit lacquer can be made in a cheaper way by dissolving two parts of gum sandarac, one part white shellac, one part W. G. rosin and one part thick turpentine in twelve parts of 188-degree denatured alcohol.

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Spirit Enamel White.

Formula for spirit enamel white:—

For a white spirit enamel, it is essential that neither zinc oxide nor a shellac solution be used, as these tend to disintegration when mixed for a short time only.

A solution should be made of the very palest manila gum and 95 per cent. denatured alcohol, 188-degree proof, which must be free from added water. One part by weight of the pulverized gum to two parts by weight of alcohol will produce the solution, which can be hastened by operating in a warm place, but should not be heated so as to avoid loss. When solution is effected the clear liquid may be poured off and balance filtered to remove any foreign substance that may have been in the gum.

To facilitate the preparation of the enamel and have it of fair elasticity, pure white lead ground in white damar varnish in paste form should constitute the base and should be reduced with the alcoholic solution of manila gum referred to.

Four pounds chemically pure white lead in damar varnish and ten pounds alcoholic solution of palest manila gum are intimately mixed and strained through several thicknesses of cheese cloth, producing about six quarts of white enamel. This can be applied over any well-prepared ground of oil paint.

For a higher grade of spirit enamel, that is resistant to moisture, a solution of 5X Kauri gum in amylactate at the rate of three pounds of the pulverized gum to one gallon of the liquid (or solvent), well settled after solution and used with pure white lead ground in damar varnish, as above, say four pounds of the white paste to one gallon of the solution will produce a high gloss white enamel, but amylactate having a solvent action on previous coats, this spirit enamel should be applied with a spraying brush.

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Suitable Baking Oven for Enameled Hand Rails.

The oven can be constructed of sheet steel, and for your purpose should be of sufficient height to hang the rails on hooks to the ceiling of the oven, which should be provided with same in such number as may be convenient. It is not necessary to line the oven either inside or outside, as, if enamel is to be a cherry red, it will not require a temperature higher than 160 deg. F., because most reds will not bear a greater degree of heat without destroying the color. Ventilation will be required to prevent sweating of the enamel during the baking process. This can be provided by having openings on the top or in the sides near the top of the oven that may be closed with slides of same thickness of sheet steel. If the oven is to be heated with steam coils must be provided in bottom of oven near the floor and on sides of oven, while if gas is to be used numerous jets should be set in the bottom, over which a metal screen is arranged to keep the flames from coming into direct contact with the articles. An opening should be in the door of oven about half way up its height, in which a thermometer is placed, through a cork, and by this the degree of heat is determined. The hand-rails are best placed in the oven before the color begins to set and before the temperature in the oven is over 75 or 80 deg. F., and heat should be turned on as soon as it is filled. The baking time should not exceed two and one-half to three hours at 160 deg. F.

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Heat-Proof Black Enamel.

Formula wanted for a black enamel that will not readily burn off. Should be odorless and non-explosive while being used and when applied to hot surfaces.

You cannot expect a black enamel to be entirely odorless, but you can, if you do not mind paying the price, obtain one from any good varnish manufacturer that will not emit a disagreeable odor during the hardening or baking-on process and certainly not after that. Most of the lower priced heat resisting gloss blacks are made from asphaltum gums with more or less treated drying oil and volatile thinners. The odor depends largely upon the latter, as does also the price. If ordinary benzine is used as thinner the odor will be more disagreeable and the danger of explosion is, of course, very great, while with the heavy petroleum spirit, known as turpentine substitute, the risk of explosion is no greater than when pure spirits of turpentine is used, while the odor in this case, as well as with turpentine, can be made less disagreeable by the use of liberal quantities of oil.

If the black enamel is to be applied to objects in the interior of a building, such as steam pipes, etc., and you wish to mix it yourself, we would say that you can make one of good elasticity and fairly heat-proof by breaking up two and one-half to three pounds of coach or drop black in oil with about one-half pint of spirits of turpentine until you have a smooch thin paste, then add enough of a good varnish, that ordinarily dries in about eight to ten hours, to make one gallon of paint, which strain through a fine sieve when it is ready to use. The varnish must be of good body if high gloss is desirable. This gloss black or black enamel, whatever you choose to call it, will not suit for hot stacks exposed to the weather, as under the influence of rain on the heated surface the gloss would soon disappear. For that purpose the asphaltum varnishes, as supplied by varnish makers, are preferable.

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Testing Wearing Qualities of Baked Enamel Signs.

Any acid test on baked enamel coatings to establish comparative wearing qualities would be misleading, for the reason that the life of these coatings depends upon several factors, the same as those that are to be considered with air drying gloss or varnish coats. To enumerate these factors, the first is the condition of the metal before the ground coat is applied, next comes the composition of the ground coatings and the temperature, to which the various coatings are subjected in the operation of stoving (or baking), the nature of the pigments employed and last, but not least, the toughness and elasticity of the medium in which the pigment is mixed. Leaving the question of the more or less brittle character of the pigments out of consideration, it stands to reason that for wear in exposed places the adhesive qualities are imparted by the baking varnish. The protection afforded by the varnish to the coloring matter will not permit the agencies that are quick to destroy air dried paint to act on the baked enamel in any degree. If you desire to discover how much more resistant baked enamel proves than air dried coatings, make comparative tests of them with paint and varnish remover, which will give you a very fair idea of the adhesive properties of the baked coating, and this test, together with trying the solidity of the finish, is all we can suggest, unless you do not object to a long exposure test on a roof.

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Enameling Iron to Resemble Agate Ware.

We have never had occasion to do any work of this kind, but will say that the iron must be clean to start with, free from mill scale and rust spots. An enamel paint will not produce the effect desired, as a glaze is required, which permits the metal to show through, thus producing the agate ware effect. But unless you have facilities for baking such a glaze or transparent baking japan on the articles in question, we should advise you not to undertake the work. If the articles are not too large and you have the stoving apparatus, you can, no doubt, obtain the baking japan or varnish from a reputable house in your town, together with direction as to temperature required.

—642—

A White Enamel Effect for Toys.

Wanted a cheap white enamel effect for toys preferably to be applied by dipping with an enamel or clear varnish. A mixture made of whiting and zinc oxide with varnish and soda lacked opacity and had a tendency to lift when the second coat was brushed on.

To make a white gloss dip for toys use pure zinc ground in bleached linseed oil and break it up in a free-flowing pale varnish, or better still, break up the zinc paste in pure turpentine to the consistency of a thin varnish, then to produce gloss add all the pale mixing varnish it will bear and yet cover up the surface.

Or thin the zinc paste with turpentine or benzine and dip toys into this mixture and let it dry. Then dip the toys into a pale, clear varnish and allow to dry. However, in this case use some white japan drier with the zinc paste and turpentine or benzine. We have known some furniture factories in the East which made babies' chairs and enameled them in white by having pure zinc oxide ground in water, thinning this paste with a solution of white or Flanders glue, into which mixture they dipped the chairs, and either sold them in that shape or else dipped them finally into a thin pale varnish. In painting toys no lead or other poisonous white should be employed, as such processes are liable to give you trouble with the health authorities.

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Varnish Blistering During the Baking Process.

Why should varnish blister on wood and not on metal, when subjected to a temperature of 180 deg. F. in a drying oven, when the same thing was previously done at 190 deg. F. with satisfactory results? Is there sap in the wood in one case and not in the other?

Metal being practically non-porous does not give up moisture when subjected to the temperature referred to, while the blistering of the varnish on wood is most likely due to the wood being less well seasoned or not as fully kiln dried at one time as it may be at another time. The blistering cannot be laid to the varnish, so long as it only blistered on the wood, taking it for granted that the wood and the metal were coated and the varnish baked on at the same time, and in the same oven.

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Mahogany Stain Bleeding Through White Enamel.

A room of birch was stained imitation of mahogany, in high-gloss white enamel. Washed woodwork with a sal soda solution to cut the gloss, then painted with white lead, linseed oil and turpentine, followed with three coats flat white, finishing with a high-grade of white enamel. The finish was perfect, but several weeks afterward it showed up pink, due to the mahogany stain bleeding through the white.

There isn't any doubt that the stain contained a color of the Para red type, which will bleed through any white or light tint, especially when the stain is not covered by heavy coats of varnish or when the body of the varnish has been affected, as was the case in the instance you cite. The only way to hold back the stain is to apply a coat or two of rubbing varnish or shellac varnish, which should be mossed down and a coat of flat white applied over it.

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Preventing Rust Under Air Drying Enamel at Soldered Places.

A method that will prevent rust coming through air-drying enamel at places on metal where soldering acid has been used.

If there are no signs of rust coming through your air-drying enamels, excepting on the portion of your metal where soldering acid has been used, then the acid effects must be neutralized by an alkali before the enamel is applied. This can be done by going over such places with a strong solution of soda, daubed on with a soft fiber brush and subsequent rinsing with clear water. The metal, however, must be thoroughly dried before proceeding with the application of the enamel paint. Daubing the soldered spot with dead flat black paint might also prevent rust from forming on the solder.

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Enamel Paint for Touching Up Cooking Utensils.

Wanted a formula for making an enamel in white or gray, that can be used for putting on damaged enameled ware for cooking on stoves or ranges; one which will stand the heat and not come off into the food.

To the best of our knowledge there is no possibility of this being done with enamel paint. The only enamel known for such purpose is applied by the process in which the enameled ware you wish to repair is originally made, the enamel here consisting of the oxides of different metals with a vitreous flux, and after being applied to the article it is subjected in kilns or furnaces to a heat that sometimes reaches anywhere from 1,800 to 2,500 deg. F.

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Painting a Copperlined Bathtub with White Enamel.

Correspondent says:—"I painted a copper lined bathtub with white enamel and when finished it looked fine, but after a few weeks the coating became streaked and finally it could be rubbed off by the touch of the fingers. Can you account for this and advise me how the lining should have been treated to make enamel white adhere firmly? I do not care to remove the tub and install a modern one, as I do not own the property.

We take it that you applied the enamel directly to the metal without any attempt to prepare the surface to permit a good hold for the gloss paint. Tubs lined with sheet zinc or copper will not allow paint to hold, especially when it contains a liberal portion of oil or varnish, unless the lining is thoroughly cleaned by scrubbing and made rough by rubbing with sand or emery paper. Then one coat of a flat primer, made up of flat white, tinted with a trifle of lamp-black to a light gray, and the addition of strong coach japan and a little turpentine should be given, rather slim, well brushed out and allowed to dry hard. If not covered sufficiently apply a second coat of this and when dry and hard apply good bathtub enamel white. The idea of having the ground coat in light gray is to enable you to notice any spots not uniformly covered. Do not permit water to run into the tub until the enamel is hard and have the water cold on first filling the tub. Let the cold water remain in the tub for at least 24 hours before admitting hot water.

GRAINING.

—648—

Why Whiting and Beeswax Are Used in Graining Colors.

Why, how and in what proportions is whiting used with graining colors? Also, why is beeswax used in oak graining color; also if prepared graining colors contain the whiting and beeswax?

We cannot speak for the manufacturers of graining colors and the composition of, their materials, and cannot say whether any or all of them contain whiting or beeswax. But we know that a graining color in oil is all the better in its working properties when the strength of the colors that compose it is reduced with anywhere from 15 to 25 per cent. of whiting, as the latter keeps the color, when wiped out and combed, from running together. One ounce of beeswax, melted and dissolved in turpentine, to a quart of graining color, will make the latter work more sleek, but is liable to make the varnish creep, unless the graining is allowed to stand a month or two before it is varnished.

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Finish for Exterior Graining and Hardwood Work.

What is the best finish for grained or hardwood finish on outside work?

Mr. O'Hearn said this was a question on which various men had various opinions. For outside grained work he would not use varnish, but a clear coat of raw oil with a little turps and drier to make it dry in a reasonable time. He would rub it every month or two with an old rag. He believes this would also be satisfactory on an outside hardwood finish. A thin coat of varnish might be applied and then oiled. It was taken for granted that the work was to be oiled first.

Mr. Wall said that on outside grained doors he believed in using raw linseed oil with a little drier flowed on and rubbed out with a dry brush. A comparatively thin coat of varnish is better than heavy coats. But such work must not be washed with soap and water, or hot water, or it will be destroyed.

Mr. Dewar said the best process depended on locality. In a dirty city like Pittsburgh this process would not answer. It is natural for the average housekeeper to use hot water and soap, and then off comes the graining, too. With hardwood, to finish so it will stand a reasonable time, I would use in my filler a great deal of oil. This brings out the natural color of the wood on outside woodwork. I would use one-half to two-thirds oil in the thinner of the filler and a very little good japan, and would give it three or four days to dry. This will not be spotted by rain. I would then give a good coat of outside varnish and would get in touch with my varnish manufacturer and tell him I want a varnish that will stand the weather. Give it from two to three coats and allow six days between coats. For bathrooms and servants' rooms I use a carriage painters' one-coat coach, paying a good price for it, and I allow eight days between the coats. Don't use cheaper grades of varnish as you come up. If necessary use a quicker drying varnish on the first coat only. Varnish is varnish, and don't expect from it what you would look for in iron and granite. That which I have specified for hardwood I would also use for grained work. Graining is often spoiled by using too much oil and too much color in the groundwork. Don't use oil in the ground, add a little oil varnish. Don't use more than two coats on new work. If there is trouble with sap, give a coat of shellac and one coat of color. The first coat should not be a priming but a good second coat, just thin enough to even up all over. Never use oil in the varnish. If varnish must be applied in cold weather use turpentine.

Mr. O'Hearn said after about twenty-seven years of graining he would hate to grain on two-coat grounds on new work. A man can't wipe it out. The pine is spongy. All over the door will show little dark spots and there is not enough body to wipe out the lights properly, although it may wear all right.

Mr. Dewar said judgment must be exercised as to the heaviness of the two coats. He used them to a consistency that will give the grainer a good surface to work on.

Mr. Wade said it depended on the woodwork, and the greatest trouble is the men who do the grounding do not use judgment. The whitewood that is used in Pittsburgh requires very different treatment than pine. You can use two coats on pine if you use an abnormal amount of drier, say one-half pound to twenty-five pounds of color, on the priming coat, which is mixed heavy, and then apply the second coat of color thin. You will find that this is all right to grain on. It depends on whether you use oil or water color for graining. I think a thin coat of shellac and a properly applied ground coat will make a better job. In water color graining these troubles are not met with.

Mr. Hughes said he was no advocate of varnish. He finished all his hardwood with wax, and he thought it the only way to treat hardwood. It gives a soft luster that you cannot get with varnish. It will stand a great deal of abuse that varnish will not. People like the wax better than varnish. You can easily clean it up and bring it back to good condition again. I had some outside doors that had stood for three years (facing west), and that had not been taken care of. They looked pretty bad, but in three hours these doors were made to look as good as new. A man who varnishes over wax doesn't know his business. He told of a case where the owner did not like the color and he took the wax off a room with turpentine and then washed with benzine; removed the color; stained it over again and refinished. The wax is always feeding the wood and does not dry out like varnish. I think the luster with any decoration with wax finish is more pleasing than varnish.

Mr. Dewar said that more than one-half the good residences in Pittsburgh are finished with wax. It is very difficult to remove the wax sufficiently to refinish it with varnish.

Mr. Hughes said he advocated finishing all hardwood in wax. Varnishing hardwood is something like painting the lily. It costs more to use beeswax than to buy prepared wax, although this also gives good results. The first application is a generous coat of wax, not too thin. I let it stand twenty-four hours, then polish. The second coat can be polished after an hour or two.

Canadian Convention.

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To Keep Graining Color from Flowing on Combing.

Is there anything that may be mixed with oil graining colors that is superior to wax, to prevent the color from flowing together on combing or when using the roller?

Some grainers add wax, others add a little soap to the oil graining color, but in either case it is apt to create trouble in varnishing. We have always favored the addition of very fine dry whiting and a little extra turpentine, which will keep the color from running together after combing or rolling. Another precaution is not to wait too long in applying the graining color, after the ground has once hardened. Sometimes a little soap added to the grain color in addition to the whiting will make it work more freely and evenly, but care must be taken to use the minimum quantity.

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To Prevent Crawling.

How can you prevent crawling in cold weather?

Go over the work with benzine and a clean brush on the coat where the crawling comes.

Mr. Wall said this applied equally to varnish. The benzine completely evaporates. It will stop crawling absolutely. You put on your varnish over it, and it

will stay there beautifully. It was just as good if you do it the day before. It has absolutely no effect on the superimposed paint or varnish.

Canadian Convention, 1907.

Mr. Stamp said that where graining had a tendency to crawl you could stop it by using benzine.

Mr. Wall said he would use benzine in cold weather. When you put the second coat over varnish or paint in cold weather, put a coat of benzine on it first and then you can put the paint or varnish on as much as ten hours later and it will not crawl.

Mr. O'Hearn said that in cold weather you will find creeping when graining. But instead of using benzine his plan is, to the pot of graining color, to add a teaspoonful of grain alcohol; stir thoroughly and add a little more drier and the paint will go on without crawling. It will also answer in varnish or in ordinary paint.

Canadian Convention, 1906.

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Curing Tackiness of Varnish Over Graining.

A hall and dining room were grained in the spring and plenty of time allowed for drying between coats, and finally a hard drying varnish was used; but this varnish did not dry as hard as expected and several months later retained quite a tack.

The best thing to do in a case of this kind is to take a chamois skin and wring it out in clear water, going over the whole surface with the chamois skin and then allow the surface to become dry. Then give the surface a coat of grain alcohol shellac varnish, which, in order to work freely, may be cut with some additional alcohol, but wood alcohol shellac varnish must not be used, nor wood alcohol for cutting the shellac, as that might lift the varnish and make matters worse. If the shellacked surface is undesirable on account of dullness or for other reasons, it may be cut lightly with fine sandpaper and then finished with a hard drying interior varnish.

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Grained and Varnished Work Peeling to the Ground Color.

The outside doors of several houses were primed with white lead and oil, the second coat was white lead, thinned equal parts of oil and turps, third coat flat, then grained in oil, and after several weeks finished with elastic body varnish. After six months or so, the paint began to peel from the priming. What was the cause?

We believe the trouble is caused by your ground being too flat. Graining in oil should not be done on a flat coat, especially on outside work. Even for inside graining it should have at least a good eggshell gloss. Your second and third coats of ground probably did not contain enough binder to withstand the contraction of your graining and varnish coats on hardening. We do not think whitening a good material for priming outside work, though a very small percentage, say 5 or 10 per cent., mixed with pure white lead, would do no harm.

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Preparing Gelatine for Transfer Graining.

A formula was desired for preparing gelatine to transfer grain color from natural wood to graining grounds.

The best plan will be to prepare a mass, similar to that used in hectographs. For your purpose, however, we would suggest the following composition:—Soak two ounces of best gelatine in cold water over night. Pour off the unabsorbed water and warm the swollen gelatine in a hot water bath, and add twenty ounces of refined glycerine, ten ounces barytes, finely pulverized, and two ounces dextrine. Mix thoroughly, while heating, then pour into a shallow form or pan, set it on a level and allow to cool.

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Ground for Graining Rosewood.

William E. Wall, the well known grainer of Somerville, Mass., says:—All graining colors are transparent and it would be impossible to produce a job of rosewood from a black groundwork without repainting. The ground color for rosewood should be a rich, deep orange tinge made with white lead, orange chrome and Venetian or red lead. Graining is usually done by applying a darker color over a lighter one.

James Ross, a well known grainer, of Philadelphia, says he uses finely ground Venetian red of dark shade as a ground for rosewood, sometimes adding a little orange chrome to brighten it. For the overgrain he uses Vandyke brown, with or without ivory black in distemper, thinning with stale ale or beer, according to the depth required. He is of the opinion that the use of drop black as a ground would make too dull and dead an appearance and necessitate the putting in of the growth with a rich red lake, causing loss of time and giving poor results.

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Light and Dark Oak Graining in Water and Oil.

For exterior graining we think that in oil the best, because most durable, while for interior work, graining in distemper is generally preferred. The groundwork is the same in both cases, a buff tint, made from the white, yellow or yellow ocher and a trifle Venetian red, thinned so as to dry on the last coat with eggshell gloss. Before distemper color is applied the ground should be dampened by rubbing it over with a sponge that has been wrung out of old ale or beer. Less than three coats of ground color will not make a good job. The color for graining in imitation of light oak in oil is mixed from raw sienna and raw umber, to which is added some dry whiting to keep the color from running together on combing. The mixture is thinned with boiled oil and brown japan and a little turpentine. The same colors are used for dark oak, but Vandyke brown or burnt umber is added to deepen it. Whiting is added here also for the same purpose and the same thinners are used. Glaze over with asphaltum thinned with turpentine and a little boiled oil to keep from setting too quickly. Graining in oil should not be varnished until after it has become thoroughly hard.

The colors for distemper (water) graining are the same as those used for oil graining, with the exception that they are ground (without size) in water. But the thinner or binder should be beer, vinegar, ale or whisky, stale ale being considered best, having the most binder. The glazing colors in all graining must be transparent, and mixed very thin, whether thinned with oil or water.

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Hints on Oak Graining.

When doing a job of oak graining on new wood, give the surface three good coats of color. The first coat is to be thinned with equal parts of raw linseed oil and turpentine and a little coach painter's japan. The japan should be stirred in before the lead is thinned and care must be taken not to make the lead too thin and watery. After the priming is dry, sandpaper and dust off, and then putty up well the nail holes, joints and uneven places. Whiting thinned with drying oil is used to make the putty. The drying oil is made by taking ten gallons of raw linseed oil and putting it in an iron kettle. One pound of litharge should be tied up in a muslin sack and suspended in the kettle just so it will not touch the bottom. The oil is then boiled slowly for an hour and a half. It is a good plan to have a sheet iron cover for the kettle to prevent it from boiling over.

The first coat may be all lead or four parts lead and one part ocher. The second and third coats should be white lead tinted with a little chrome yellow and a few drops of red. In these last two coats of groundwork, a little gold size

japan and a little quick rubbing varnish should be stirred in while the paint is in the paste form. It should then be thinned down with turpentine, strained and applied with a white bristle, oval varnish brush.

After the last coat of groundwork is dry, sandpaper off and give a good dusting, when the surface is ready for the oak graining.

There is now in the market both light and dark oak, **ground very fine in oil**. By adding a little coach painter's japan, a little raw oil and a good deal of turpentine, you are ready to rub on a thin coat on one panel. To do this you need a one-inch, a two-inch and a three-inch double thick white bristle varnish brush. Now, with some soft rags, a piece of rubber or potato, and a set of steel graining combs, wipe out and blend, imitating as near as you can some piece of natural oak wood. When the work is dry, overgrain with the same graining color, by combing with your rubber, and wiping with your rag in the opposite way and shading your knots. Some very pretty effects can be produced in this way. After the job is dry, give a good coat of finishing gear varnish.

H. J. McGraw.

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A Few Hints on Marbling.

Marbling is the art of decorating painted surfaces to imitate natural marbles and bears some resemblance to graining in imitation of natural woods. We will give in the following some idea of how a few marbles are imitated:—

Derbyshire Spar.—Use a light gray for the ground color and glaze it with a thin mixture of dropblack and Vandyke brown and a little Indian red here and there. To stimulate the fossils use a stick with a piece of rag tied around it, then glaze with the same colors and bring out the fossils with solid white, ending with fine lines of black.

Granites.—The varieties are chiefly gray and red. The ground for the former is a light gray tint, and a salmon tint for the latter. The marbling color for the gray is thin black, for the red a mixture of black, red and white. These colors are put on in dots and splashes, by stippling with a coarse sponge or by springing the color from a short, stiff brush.

Gray and White Marbles.—While this is very simple, it requires skill to do it properly. For ground use lead color for gray and white for the white. While the ground is still wet, vein and mottle with drop black and slate color and blend it all down softly.

Verd-Antique.—The ground for this is black. Drop black in oil should be used. The grains are to be white, chrome yellow, blue and red. Cover the ground with a dark green, made from chrome yellow and Chinese blue, and add with a soft fitch some patches of a lighter green and here and there a little burnt sienna or Indian red. Intersperse here and there with irregular blotches of white and black. Blend softly, then give a glaze of Dutch or Italian pink and chrome green, and finally touch up the white spots and give them a fine black outline.

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Colors for Marbleizing by Dipping.

How are colors mixed or prepared for floating on water, so that they will be available for marbleizing by the dipping process.

The colors ground in oil offered by color manufacturers are well suited to the purpose. They are mixed with boiled linseed oil to the proper consistency and floated on the water in the basin or trough in such a manner as will produce the proper veins. The mantels of slate are first coated with black, ground in varnish, then baked, then rubbed to a smooth surface, and if not smooth enough, again coated with black in varnish, baked and rubbed, then immersed in the water, the colors floated on the surface of the water, when the slate is brought up, permitting the oil color to adhere to it. After drying the mantel is again baked and finished with a coat of varnish, that may be polished.

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Cause of the Cracking of Grained Work.

This subject has been under discussion in a master painters' organization and various reasons were given by experienced men. Some of the speakers laid the blame on green varnish, others on the fattiness of the graining color and others again on the ground being too oily. Boiling down the various opinions, we take it that in order to prevent grained surfaces from both peeling and cracking, the ground color should be pure keg lead, tinted with oil color to suit, thinned with turpentine and liquid drier only, so that it will dry flat as possible; when oil color is used for the graining it must not be fatty, but fresh goods, thinned with turpentine and drier only, as the colors contain enough oil for binder at any rate.

Lastly, the graining should be allowed to stand at least two months before being varnished over, and even then a heavy varnish must not be employed, but a light bodied outside varnish or a varnish that has been cut with turpentine.

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Graining Wood in Imitation of Mahogany.

Make your ground color of two parts of orange chrome yellow in oil and one part bright Tuscan red in oil and thin with turps and a little drier so as to dry with eggshell gloss only. Apply two coats for new work, so that the wood is well covered. For the graining color use a rich burnt sienna and a little Vandyke brown, both ground in ale or beer for distemper graining, and if the effect is not rich enough add a trifle of madder-lake, also ground fine in the same vehicle. Thin the color for spreading with stale ale or beer, and before applying it saturate a sponge with the same liquid and dampen the ground all over. If two coats of ground do not cover up solidly, give a third coat, but in that case let this coat dry out with more than eggshell luster. The tools required are a sponge or cloth or a piece of buckskin for wiping out the lights; an ordinary paint brush to put on the color, a blaze stick to make the bright blazes in the center of the branch. This may be made from a piece of wood shaved down thin, or a paper card three inches long, one inch wide and very thin. A blender to soften the work, and a top grainer to put in the dark grain. Spread on the color with the brush, after dampening the ground work, and blend crosswise. Wipe out the lighter parts with sponge or cloth, then blend again, until softened, and put in the blazes through the center with the blaze stick. Now blend down the crude roughness of this lengthwise; when dry rub off the rough particles with a soft cloth and give a coat of thin varnish, a quick rubbing varnish being best.

Next a glaze, made by adding a trifle of asphaltum to the graining color and reducing it to a very thin consistency with ale or beer, is rubbed out well over the whole surface, and blended crosswise, then stippled with the blender. When dry, the dark top grain is put on. To finish, a coat of hard drying coach varnish is flowed on with a thick badger brush.

The style of grain varies, and it is best for the beginner to study the grain in the natural wood and imitate this as closely as possible. In panel work, crotching generally is resorted to; the cutter is used to take out the lights and the fine lines put in with the overgrainer, used almost in its normal condition without being broken up into teeth, the lines running in a wavy pattern across the panel, like the inverted letter V.

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Rosewood and Mahogany Graining Color in Distemper and Ground for Same.

The ground for mahogany should be made by mixing yellow ocher and Venetian red, ground very fine in oil and thinned with turpentine, adding suffi-

cient drier. It should dry flat and be applied thinly with flat bristle brushes, so as not to show brush marks, which are very aggravating to the grainer. Three thin coats are none too much for new wood, and far better than two stout coats. For rosewood, the ground should be made of medium or orange chrome yellow and dark Venetian red. Indian red should not be used, as the ground made with this pigment is too dull.

As to graining colors in distemper, the grainers to the trade usually buy the various colors in water as suits their requirements. The water or distemper colors used in mahogany are burnt sienna and Vandyke brown, the latter being used to put in the darker veins. If the sienna is not rich enough, some crimson lake may be added.

For rosewood, the colors are Vandyke brown, ivory black and rose pink, the basis of the color is Vandyke brown mixed with a little ivory black, the rose pink and the ivory black are mixed separately and streaked through the base color, then carefully blended. All of the colors can be had, ground finely in water.

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Imitating Quartered Oak.

It should always be borne in mind that in imitating quartered oak, or any other wood, that it is the natural we wish to imitate and not some one's idea of what it should be. Therefore, it is necessary to first study the various changes of grain and have the general character of the grains of the particular wood impressed on the mind before beginning to work.

In graining to imitate quartered oak, wipe out the champs or veins with the rag, and soften the combed portions between the champs by drawing a rag folded three or four times toward the edges of the work previously wiped out with the rag. The edges of the champs may first be sharpened up by drawing the second joint of the forefinger against them. A fine comb is then lightly waved over the space of open work and the whole panel or mantel blended lightly crosswise with the flat brush. Or the work may be combed as described and permitted to dry before taking out the champs. In that case, when the work is dry, mix a weak solution of sal soda and add to it some dry umber, to show where you touch the work; put the solution on the champs with a fitch tool, let it stand a few minutes to soften the color, and wipe it off with a soft rag. It will be found that the graining color is taken off to the groundwork, giving the same effect as if it had been wiped out while the color was wet, but the work looks cleaner. When done in this way, the work should be overgrained. The champs may also be put on in dark colors over the combed work and left so, as some veins of oak appear dark in certain lights. These dark veins may be imitated by combing the work the same as if one was going to use the rag to wipe out. Do not blend, but put in the veins with a small fitch tool or fresco liner dipped into some color from the bottom of your pot, not too dark, and immediately blend one way, lifting the edge of the color. After some practice it will be found that a very good imitation of dark champs or veins is the result.

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Preventing Spirit Stain from Raising the Grain of the Wood.

What can be added to spirit stain that will prevent it raising the grain of the wood, oak for instance?

Expert wood finishers add very little glycerine or castor oil to the stain, but great care must be exercised as to the proper quantity to be added, both of these mediums being rather greasy in nature and if added in excess the shellac or other varnish applied over the stained wood is apt to crawl or creep. Castor oil is probably the best of the two articles, but a tablespoonful is sufficient for a quart of the stain, and even then plenty of time must be allowed for the stain to dry thoroughly before filling or varnishing the surface. In the case of Flemish

oak, which is neither filled nor varnished, a more liberal portion may be used. If you are afraid of using either glycerine or castor oil, you may use a trifle of shellac varnish or Venice turpentine, neither of which is of an oily or non-drying nature, introducing either of these into the stain in small quantity, say a tablespoonful to one pint of the stain. Of course, anything you add to the spirit stain to prevent the raising of the grain will tend to diminish the penetration thereof, but at any rate, for a good job of staining such an open grained wood as oak, two coats of stain should be applied.

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Graining on Worn Linoleum.

The special requirements are to first dust the floor, then wash it with soap-suds to which a little ammonia is added, using scrubbing brush, mopping up with a large sponge, then rinse with clear water most thoroughly, so that every vestige of soap is removed. Allow to dry, then apply the proper ground coat or coats, as may be required, which should dry flat, or at most have an eggshell gloss only. If the job must be hurried use colors ground in japan for the graining and finish with two coats of best floor varnish. Otherwise you may grain in oil color, cut with turpentine, and varnish later on when the graining has become hard.

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Graining Colors for Early English and Weathered Oak.

The ground for early English oak should be a very dark gray or lead color. The grain color is made of yellow ocher or raw sienna and raw umber with a dash of chrome green. Mix some whiting with the oil colors to keep it from running together when it is combed. You no doubt know that japan is necessary to make your graining color dry and that you must not use oil, but thin with turpentine. Put in the grains, lights, etc., as you would for light or dark oak. If desirable, glaze with asphaltum that has been dissolved in turpentine, and to which a little boiled oil has been added to keep the glaze from setting too quickly.

The ground for weathered oak is burnt umber, to which a little black may be added if desirable. Have the ground coat dry with eggshell gloss only, and when dry and hard rub it over with whisky or alcohol, if the weather be cold, while in moderate temperature stale ale or beer will keep the grain color from creeping. The graining must be done in distemper, so as to produce the flat effect of weathered oak. Vandyke brown ground in water and mixed with stale ale or beer is the proper color.

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Imitation of Marble with Paint—Marbelizing.

For white marble have your ground clear white, for gray a lead color of proper depth of tint. Vein and mottle with black and slate color in the wet paint and blend the whole down with a paint brush. For darker marbles apply your ground work, and when dry rub down, then dampen the surface with boiled linseed oil rubbed on with a cloth. Into this, without permitting the oil to dry, you put the veins as follows:—For Italian marble the ground being black, you scramble out in patches with thin white lead in oil and turps with a sponge and blend, then with a hair pencil trace in the larger dark veins with burnt sienna, then with yellow ocher, then with gold tint, running the lines over each other, yet all in the same direction. When veined and dry glaze with very thin asphaltum in patches to give depth. Then varnish, and if so desired polish. Verde-antique is manipulated in pretty much the same way. The ground is black and the grain color white, yellow ocher and green. Scramble in large flakes of white with the sponge and blend. Trace in the ocher and green in veins with fitches, less veins than in the Italian, but heavier in large, irregular

circles. Another style is sienna marble in character and form similar to verde antique, the rings of veins being more regular in their roundness. The ground here is a tint made from white and raw sienna, which is clouded over with a buff tint in patches applied with a sponge. The dark veins are made with raw umber, while raw sienna and black, mixed to a dull green, is used for the lights. Blend lightly, and when dry varnish all.

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Ground and Graining Color for Circassian Walnut.

To finish a hotel lobby and barroom in imitation of Circassian walnut over a stained and varnished surface of pine lumber, so as to look like the real thing. How to mix the ground as well as the graining color.

It will be necessary to remove the varnish from the surface on which you wish to apply the ground for the graining. The ground is best made by mixing French yellow ocher in oil, adding a little Venetian red and a trifle of burnt umber, all ground fine in oil, adding enough white lead to the mixture to lighten it up some, as the ground for Circassian walnut must be much lighter than that used for dark or black walnut. Thin with turpentine so as to dry with no higher than eggshell gloss, and of course add the required drier. If you prefer to grain in distemper, it is best to use burnt umber and raw sienna ground in water (about three parts umber to one part sienna) using nothing but beer for thinning, and stipple all of the surface to be grained. Do not use any water, as the stippling is liable to rub up when the cloth is used for putting in the hearts. When the stippling has dried rub in the oil color, which is made from burnt umber and raw sienna ground in oil and to which some fine dry whiting is added and sufficient drier. Wipe out the hearts with a cloth as you would in graining oak or put them in with a fitch tool. Sharpen up the edges in either case with a fitch tool, then blend the whole lightly with the dry flat brush. Should you prefer to grain in oil only, rub in the color mixed with whiting and left rather stout and stipple with the flat brush, then put in the hearts with the fitch tool and blend. Use the piped over-grainer wherever it will assist you in this work. When using the steel combs cover them with a cotton rag and stipple with the dry flat brush when combed.

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Process for Imitating White Marble on Plaster Paris Casts

A reliable process or method by which to give plaster casts, not necessarily statuary, but tiles, blocks or vases, the appearance of white marble:

The plaster cast in question, or if it be tiles, where only one side is exposed, the surface, that is to be shown, is first well dusted; then given one coat of best white damar varnish, and upon this coating, before it has dried or set hard, finest pulverized flint glass is dusted by means of a bag made of gauze. When the varnish has become hard and the glass dust firmly fixed in consequence, another coat of the same varnish is applied, and while this is still fairly tacky, perfectly colorless white mica, not too finely powdered, is dusted on by means of a sieve in the same manner as signs are smalted. After the excess of mica has been removed from the now dry surface by means of a pair of hand bellows, it has plainly the appearance of white marble. The beauty of the imitated effect can be heightened when, before the second coat of varnish is applied, veins are put in with bluish, greenish, yellowish or reddish glazing color on the film of glass dust that are a good imitation of those found in natural marble. The veins show through the mica and appear quite natural. On account of the coatings that consist of dried resin and glass, consequently of resistant materials, the casts are weatherproof or at least weather resistant to a much greater extent than ordinary plaster casts.

Small plaster of paris forms may be changed into artificial marble by drying the forms in a temperature of 75 to 86 degrees F. in a drying room, then

dipping them into a warm solution of 50 parts, by weight, of borax, 1 part of tartaric acid and 500 parts water, then dried at 200 degrees F., and finally immersed in a saturated solution of borax which contains in 750 parts by weight 1 part of concentrated aqua fortis by weight. The solution is heated to the boiling point and the forms allowed to remain therein until saturated, then taken out and dried. Finally they are warmed and coated with Canada balsam.

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Colors for Graining.

We cannot recommend the use of dry colors for graining. It is much more economical to use distemper colors, that is, colors ground in water to a paste, without size for graining in distemper and pure colors in oil for graining in oil, and when quick work is necessary, colors ground in japan same as are used in coach and car work. The best and finest colors should be used, as only these give rich and clear effects. Of course, the ground work has much to do with the final effect in graining, but coarse and dull colors should be barred out.

For light oak, raw sienna is the principal graining color, to which a small portion of raw umber may be added, if the sienna is too yellowish in tone. Dark oak graining color is made from raw sienna, mainly, with small portions of burnt sienna and burnt umber. The best cherry graining color is made from equal portions of raw and burnt sienna, but sometimes a trifle of burnt umber is added to deepen the color. For walnut, about four-fifths by weight of burnt umber and one-fifth Vandyke brown is the proper graining color. This is for American walnut, while for extra dark walnut effect the Vandyke brown is replaced by ivory black. Chestnut graining may be produced by mixing raw sienna and Vandyke brown, or burnt umber, slightly reddened with burnt sienna. Mahogany graining color is usually mixed burnt sienna chiefly with Vandyke brown, and a trifle of rose pink or crimson lake. It is overgrained with additional rose pink in the color. For old mahogany effect, more Vandyke brown is used.

Rosewood graining color is Vandyke brown with a portion of ivory black, and rose pink may be added when desirable.

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Marbelizing and Graining Slate

In marbleizing mantels of slate or other material, oil colors are mixed with heavy boiled oil and floated on water in a suitable tank or trough, in which the mantels, already prepared with a suitable ground of black, gray or white, have been placed, in order to give them the proper hardness. When the color floated on the water has been distributed in the proper manner, the mantels are raised out of the water, the colors adhering to the top in veinings of the desired effect.

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Mixing Graining Grounds and Graining Colors.

No rule can be given as to the quantity of thinners used for mixing graining grounds, and as to the proportions of oil and turpentine, we would say, that for new wood, the first coat should be thinned with raw linseed oil, say, nine parts and one part of liquid drier, while for second and third coat equal parts of raw oil and turps should be used, and as little drier as possible. Three coats of ground are recommended, because thin coats applied properly leave no brush marks, which are aggravating to the grainer. The proportion of equal parts of oil and turpentine are suggested for ground colors, that chiefly consists of white lead, while for the darker grounds that contain more color, the proportion should be one part oil to two parts turps in order to dry without high gloss.

As to the proper proportion of the thinners for the graining color, W. E. Wall, one of the foremost grainers in this country, suggests a mixture of four

pints spirits of turpentine, two and one-half pints boiled linseed oil, and one-half pint japan drier, using as much of this with the oil color as may be required. As to the best material for thickening the graining color, it is a question whether or not good finely bolted whiting is not preferable to soap or beeswax. At any rate, whiting is least apt to cause trouble, which either soap or wax may do, if used in excess. If you beat up your dry whiting with the color in oil before adding all the thinners and put the mixture through a paint strainer, you will have very little trouble with its settling in the pot, especially if you do not make the color too thin. Two ounces of dry whiting to one pound of color in oil is sufficient to keep it from running. Soap is apt to affect the proper drying of the graining color, and beeswax is expensive, and when used will not permit the color to work as well as with the whiting.

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Mixing Graining Grounds and Colors.

I never recommend or use boiled linseed oil in graining color, because of its viscosity. In "Graining, Ancient and Modern," on page 17, chapter 6, under the head of "Thinners for Oil Colors," I recommend two-fifths of a gallon of raw linseed oil, three-fifths of a gallon spirits of turpentine, and add to this one-half pint of good liquid drier and about two-thirds of an ounce of yellow beeswax dissolved in the turpentine. Boiled linseed oil nearly always dries sticky and tacky, and hence is not a good foundation on which to apply varnish.

William E. Wall.

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Crayons for Graining.

First, the pigments to be used must be impalpably fine and free from all grit. As the base use equal portions by weight of kaolin (pipe clay) and precipitated chalk or pipe clay alone and still better, finest bolted English china clay, which mix with the necessary coloring matter, such as raw or burnt Italian sienna, Turkey umber, raw or burnt, Vandyke brown, ivory or lampblack, yellow or red ocher or blue. The coloring matter must be entirely free from grit also. Intimately mix color and white base into a stout paste with mild pale ale or take sweet ale made hot in which dissolve a chip or two of isinglass or gelatine. Place the paste into a cylinder of about three inches diameter, the top of which is open while the other end is firmly fastened to a perforated plate with holes of the size of the intended crayons. With a plunger or piston snugly fitting the inside of the cylinder the paste is pressed through the perforated holes in the plate and the pieces coming through are cut into the desired length and dried by moderate heat, and pointed on one end with a sharp knife. If the plunger or piston is so arranged that it can be worked with a screw for pressing out the paste through the holes in the plate a more compact crayon of better shape will be produced than can be done by simple pressure or hand power. This is the best information at our disposal, but we might say that it may be more economical for you to purchase your graining crayons through your supply house.

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Graining Woodwork in Silver Effect.

A correspondent writes:—Have finished several pieces of work in silver gray and silver oak. I use as the ground a coat of aluminum paint, just enough to cover the surface. Then mix my glaze or graining color with burnt umber, Indian red and lampblack. If warm gray is wanted I omit the black. If the work is to show grain, as for ordinary oak, glaze or blend so as to partly cover the lights after the graining has dried. A beautiful silver effect can be obtained by this method with a little experimenting by trying various colored glazings.

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Stale Beer for Graining.

The graining color should be ground in water very fine; stale beer 40 to 60 per cent. and clean water 60 to 40 per cent. can be used for thinning the graining color. If beer cannot be had, good cider vinegar will make a suitable binder for the graining color, but it does not work so smoothly as beer. Some of the "near beers" can be used, undiluted, for thinners. See "Graining, Ancient and Modern," by William E. Wall.

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How to Make Grainers' Crayons.

First make your binder by soaking gum tragacanth in enough water to soften it. Note in doing this how much of the gum you did soak in a certain portion of water, as you will require the equivalent of $1\frac{1}{2}$ oz. gum to each pound of dry color or pigment you use for making the crayons.

For oak graining mix burnt sienna and black; for maple mix raw sienna; for walnut mix burnt umber and burnt sienna, or, still better, Vandyke brown, sienna and black. Do not use lampblack of great strength, as it takes very little. Get the proper shades by testing the proportions of color necessary. It makes better working by the crayons when about 25 per cent. of the weight of the colors used is added in fine whiting. Make a doughlike mixture of the dry stuff and binder as outlined above and spread it on a smooth board with a damp knife the thickness of the crayons wanted, cut in strips and dry in a shady place.

PAINTING ON PLASTER.

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Preparing Plastered Walls.

The preparation of plastered walls and ceilings for the final coats often takes more time than the finishing. One thing is certain; to be sure of a safe, satisfactory job the walls must be properly prepared. An hour supposed to be saved at this stage often causes the loss of many hours going over unsatisfactory work. One of the worst troubles the painter encounters is the "pointing up" of cracks. Owing to settling of the building, shrinkage or faulty plastering, these cracks are usually numerous and often difficult to deal with. Portions of most cracks, large or small, have one edge lower or higher than the other. If it be plastered or puttied in this condition it leaves an unsightly ridge or hump that would never be tolerated on decent work. To obviate this and to secure a good "key" or ground for the plaster the cracks should be cut out or ripped open wide enough to secure a level surface. With most cracks a very light opening will do this. Some, however, through being very uneven, have to be cut open two or more inches wide. If there be many of these it is generally advisable to let a plasterer do the work, using mortar for a first filler. On small work the painter usually does a more satisfactory job than the plasterer. In pointing small cracks care should be taken to wet them thoroughly just before filling, and never to use "dead" plaster, plaster mixed with glue to delay "setting," or plaster mixed with vinegar or acid. Such plasters swell or shrink unevenly and are liable to powder, open up or drop out, often before the job is finished.

Either use clear plaster of paris or plaster of paris tempered with a little slaked lime. Slaked lime putty will keep practically forever, and it is handy for the workman to take with him, to mix with his plaster in small quantities as he does his work. Very little lime should be used; just enough to prevent too rapid setting of the plaster. All pointing should be troweled plentifully. Any cracks one-quarter inch or more wide should be gone over the second time after the first filling has set and should be troweled carefully. No cracks or pointed places should be touched up until thoroughly dry. Never, under any circumstances, use color mixed with oil over newly painted walls without first coating the cracks or patches with thin shellac or varnish, as the oil acts as it would when raising the grain in hardwood and raises the crack or portions of it above the surface. Never sandpaper a pointed crack. The surface of a sufficiently troweled crack presents a hard, glossy finish, which will not swell or shrink from the application of anything but oil. But in sandpapering, portions of this hard finish are cut through, leaving a spongy absorbent surface that will look slightly different from the rest whether the job be finished in water, oil or enamel. On walls where there are large gouges or small sunken surfaces or edges of patches that can be faced up and must be sandpapered, it is best to use the mixture called by the Italians "gesso," by the Germans "spechtelkitt" and by some English-speaking painters "glaze putty." It consists of a small amount of whiting mixed with warm glue size. This must be thickened with plaster of paris to a stiff paste and then a little varnish added and well mixed. This can be worked out very thin to even up sunken surfaces, does not set quickly, does not shrink or swell and can be sandpapered and coated with anything. It is seldom used for cracks, as it is slower and more difficult to handle than properly prepared plaster. It dries as hard as granite, and is often used spread thinly on walls, with color blended through it to imitate different kinds of marble.

In calcimining or distemper work it is important to remember that smooth finished walls and ceilings are seldom alike, even in different parts of one room. One part, well troweled, may be very hard. Owing to an excess of lime, used in tempering the plaster, another part may be soft and porous, thus causing "suction" or "hot spots." This excess of lime often "burns through" certain tints, rendering them cloudy and thus spoiling the work. To guard against these evils it is cus-

tomary to coat the walls with a cheap rosin varnish, known in different sections of the country as "gloss oil," "size varnish" or "ceiling varnish." This should be diluted with benzine or gasoline and used very thin. It is easily applied, dries quickly and leaves a uniform surface to work over, with no suction. It will neutralize the chemical action of lime in plaster and of most stains, but in case of bad stains from water, acid, smoke or grease it is safer to first apply to them a thin coat of shellac or flat color. Any calcimine, made with good whiting for a body, will cover this thoroughly with one coat, but in case of some light delicate tints it is sometimes advisable to tint or whiten the varnish size slightly.

On rough, sand-finished walls it is next to impossible to point up cracks so that they do not show somewhat. If great care be taken and a sand used in the plaster about the same as the finish on the walls, a passable job may be made. For many reasons it is impracticable to use the thin varnish size on this class of work. The most successful method and the one generally followed is to give the ceilings and walls a coat of very strong warm glue size. A far stronger glue size can be used than on smooth walls, as the sand finish cuts it so that it will not peel or flake. It is necessary to have it strong also to bind the loose sand, stop suction and have a good surface to work over. In case of walls that have been calcimined before and cannot well be washed off it is better to add a little alum, dissolved in water, to your glue size. Be careful in mixing not to add too much alum and to mix them at about the same temperature, stirring constantly, otherwise the glue is apt to curdle and be useless. For painting the preparation of a sand finished wall is just the same as for calcimining.

On smooth finish walls it is best to prepare just the same for painting as for water color. The thin varnish size, if thinned with benzine, thoroughly amalgamates with and becomes part of the bare plaster. It will never scale or crack, presents a good surface to work over and prevents the swelling or shrinking of cracks or blemishes in the wall from subsequent coats. It is very cheap in first cost both for material and labor, and on good jobs, without hurting the quality or appearance of the work, will save one or two coats of paint.

W. S. Everingham.

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Filling Cracks in Plastered Walls Successfully.

A painter had trouble with cracks in the plastered walls of a room that were filled six months before with plaster of paris and white lead mixed to a stiff putty, which filling was then crumbling out. Wished to know how to mix a filling that will stay firmly.

We assume that you are familiar with the cutting out of cracks in inverted V shape, also with the fact that when the plaster of paris is rather porous the edges should be oiled. Your mixture of plaster of paris and white lead may not have been binding enough, too much lead being present, or the plaster of paris may have been too old. At any rate we prefer to use freshly calcined plaster without the addition of white lead or any other material, wetting it up to proper consistency with thin glue size. If the cracks are cut in proper shape this filling will stay in. Keep the filling about one-sixteenth of an inch below the surface of the wall and let it dry hard, then paint over the filling and edges of the crack with the same color that is on the wall, and when this is dry level up with white lead putty that is made from dry white lead kneaded with coach japan and an equal quantity of glazier's putty. When this has dried hard smooth down with sandpaper and touch up to match the color on the wall. Always test your plaster of paris for binding properties.

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Practical Preparation of Walls for Tinting and Painting.

First:—The new hard-finished wall for water color.

Fill all cracks and holes with plaster of paris. (This applies to all kinds of walls.) For preparing a wall of this kind several different materials may be

used, as follows:—The common soap, alum and glue size. This size I consider good and the one mostly used. Then we have soft crystal soap and water; ordinary bar soap could be used, but it is not quite so good; some use oil shellac varnish reduced with turpentine, liquid fillers, etc., but I am not in favor of these, as the color that follows is harder to apply and will not always dry satisfactorily. The above materials will stop suction, but generally dry with a gloss. This can be prevented, however, in the mixing, by adding a little plaster of paris or whiting. Many times I have used old paint thinned with turpentine or benzine with good results.

Second:—The old hard-finished wall for tinting with water color.

If the wall has previously been tinted in water color, take a sponge and water and wash off the old color, then treat same as new wall, as mentioned above for treatment of hard-finished wall. Where the walls are old and in bad condition I have noticed on several occasions that walls have been lined with paper on which the tint is applied, but this is on cheap work only. Canvas could be used to greater advantage, but this is more expensive. When canvas is used give same one coat of flat paint, then apply your water color.

Third:—The new sand-finished wall for tinting with water color.

If the sanded walls are of good quality and if finished with not too coarse a sand, same glue and alum size as mentioned in my first treatment for preparing walls could be used.

If the wall is rather coarse I use a stout color, made of whiting (colored with a little raw umber) and glue with a little alum to harden same. Use plenty of glue in this size and it will be found to be an excellent preparation for a coarse wall, saving labor in the application of the following coat. If care is taken in the application of this size you will gain, first, a smooth wall; second, it prevents the unsightly pin holes appearing in the following coat, and, third, it will save you time and labor.

If three-coat work is wanted apply first coat with the above-mentioned mixture, let it dry hard, then apply one coat of soap dissolved in water.

Should time not permit you to wait for the soap size to dry, then dissolve one-half pound of powdered alum to one gallon of water, having one or more men to apply same, then let one or more men follow up with the color. This alum size should not be permitted to dry before the application of the color and should not be applied too far ahead of the men following with the color, as this size should appear glossy when color is applied. It should be worked, so to say, "hand in hand."

Fourth:—The old sand-finished walls for tinting with water color.

Wash off with sponge and water and then use glue and alum size, as before mentioned. As this size will not always give satisfaction for a wall of this kind you could use a varnish size, followed by a coat of lead and oil; it is three-coat work, but where only two coats are wanted use lead and oil, as the color will not peel or scale off as it does sometimes when a varnish size is used.

Fifth:—Preparing new hard-finished walls for oil paint.

All cracks to be filled as before mentioned. In case of large cracks they should be opened clear down to the lath, soak same with water, then fill with plaster of paris, let stand until thoroughly dry, then sandpaper down to a smooth, even surface. Many apply a glue size direct to the wall, but I am not in favor of this plan, because if the wall should get damp the following coats of oil will blister.

It would be more advisable to first give the wall a coat of paint, then apply your glue size, as the paint under the glue will to some extent resist the dampness and leave the glue intact.

Varnish, hard oils, liquid fillers, etc., are frequently used as sizes where walls are to be painted. These stop suction, dry quickly and at the same time save one or more coats, but cannot be recommended on good jobs because they dry too fast, have not enough oil to penetrate the plaster and in some instances cause peeling and cracking. When I do work of this kind I always use oil paint all the way through. For the first coat I use whatever oil paint I may have in the shop, using turpentine for thinning, no driers, having paint rather thin, allowing

same plenty of time for drying. For the second and following coats of paint use two-thirds oil and one-third turpentine, and if a flat or dead finish is wanted the coat previous to the final one should be in gloss finish, and if a gloss finish is wanted a flat coat is used.

The best, but more expensive, way of preparing a wall for oil is to have the wall covered with muslin, or, still better, prepared canvas. In hanging canvas many precautions must be adhered to, namely, that no blisters remain, no ridges from paste being spread unevenly and no laps. Cut your canvas at all corners and angles and join up very closely in these places. For a straight run keep the edges about one-sixteenth of an inch apart; when dry fill up all seams, bad corners and angles with a composition consisting of half turpentine and half interior varnish; add whiting as a body until it gets as heavy as soft putty, using a putty knife or scraper to fill such places. This mixture will dry in ten to fifteen minutes. Then go ahead using oil color as described above.

Sixth:—Old hard-finished walls for oil paint.

Treat old walls same as new ones if the walls have never been painted before. If the walls have been painted the most difficult and tedious task is the filling of cracks and holes.

These cracks should always be opened down to the lath, soaked with water and filled with plaster of paris a little above the wall; when dry sandpaper down until they are flush with the wall.

Then build up these patches with paint until they receive the same body as the old wall, color to be about the same shade as old color on wall, then paint your wall all over two or three coats as required, treating same according to its finish, either gloss or flat.

Suppose the wall has been painted before and the old paint is peeling off in blotches. Scrap off all the loose paint, sandpaper the wall, and give one coat of paint thinned mostly with turpentine, using a little drier. When dry make a mixture of one-half turpentine and one-half rubbing varnish, add enough whiting to make it the consistency of soft putty and fill the blotches with this mixture, using a putty knife or scraper to do so.

A second coat of this material may be required, then sandpaper, build up these blotches with paint until the surface is the same as the old wall.

Here is another mixture:—Make an ordinary paperhangers' paste, using white flour; when cold add whiting until it is as heavy as keg lead; run through a paint mill, or, if no paint mill is at hand, work same with a spatula or scraper, until it is free from lumps; then make another batter of oil, with a little drier added, mix same with whiting until it gets like heavy gravy, then run through mill. Mix these two batters together in equal proportions. Apply this in the same manner as the former, also same treatment afterward.

Seventh:—New and finished walls for oil paint.

For first coat use oil and turpentine, then follow with oil and lead until the required body is obtained to receive the finishing coat.

If walls are coarse and full of hollow places, apply first one coat of heavy glue-strong kalsomine, then proceed with lead, oil and turpentine as before mentioned.

I prefer to use lead and oil for all undercoating of walls of this kind, as walls so treated have more life and last longer, having more stability than a wall treated with glue or varnish size.

Eighth:—Old sand-finished walls for oil paint.

Open up all cracks, soak with water, fill with plaster of paris and fine sand (the so-called crystal or glass sand), trowel same down, being careful not to gather up any ridges, using plenty of water and a cork trowel, as this will bring the sand to the surface.

First treat the cracks as before mentioned, then follow with lead and oil as required to finish the walls. If these walls have previously been tinted with water color, use lead and oil throughout.

Karl Holm, at Ohio Convention, 1907.

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Preparation of Plastered Surfaces for Painting.

In the preparation of all plastered surfaces great care is required to make a thoroughly workmanlike job. A good surface must first be attained by the removal of all irregularities by scraping, sandpapering, etc. Our practice is to apply the priming coat composed of white lead, zinc, etc., and necessary oil and small quantities of japan, to the surface of the wall or ceiling. When this priming coat is thoroughly dry, we face up all small cracks, irregularities, etc. This is all done as far as practical before the second coat is applied, and if the finish is to be flat this plan produces an excellent finish.

Should a particularly fine surface be desired, and when the finish is to be gloss and fine enamel, we have used with great success a sizing coat of English white applied in an almost jellied condition. When this completely hardened we have rubbed it down with lump pumice stone. This fills up all irregularities and produces a ground for the paint, and generally when this method is followed a beautiful surface is obtained.

D. A. MacGregor, at Pennsylvania Convention, 1907.

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How Should Cut-Out Cracks in Plastered Walls Be Treated to Prevent Striking Through New Paint?

A Galion, O., painter had trouble with cut-out cracks in old plastered walls showing through the new paint, which was a light tan color applied over a pea green tint. The cracks were properly cut out in the customary way, filled with calcined plaster and given a coat of shellac varnish, but afterward showed through two coats of the new paint.

Shellac varnishing the filled cracks is usually resorted to in order to stop suction and to prevent the cracks showing up darker than the balance of the newly painted surface. But it is far better to glue-size the cracks or stop suction with wall varnish and then to touch up the cracks with color closely resembling the old paint before repainting.

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Glue Soap and Alum Size for New Plastered Walls.

Every plastered wall that is to be kalsomined or painted in water color of any kind should first be sized, whether the wall be smooth or sand finish, and whether the ordinary kalsomine or the prepared kalsomine be used. The best size we know of is prepared by dissolving one pound of white glue in a separate pot, then one pound of rosin soap is sliced fine and dissolved by boiling with water in another pot, and two pounds of alum are also dissolved in hot water. Mix the glue and soap solutions together, then add the alum solution and thin the mixture to the consistency of a thin varnish.

Two quarts of water are used to soak the glue and two quarts more in boiling. Four quarts of water may be used to make the soap solution and two quarts more for the alum. This will, when mixed together, make three gallons, and two more gallons of water should be added, making a total of five gallons. This will be of about the right consistency for a soft wall, but for a smooth, hard plastered wall, it may be thinned still further with two and one-half gallons of water and will then be strong enough.

Rosin soap is made from ordinary rosin and oil, generally cocoanut oil, saponified with soda. It is yellow or brownish in color and rather sticky, but excellent for cleaning grease or paint from the hands, etc. Yellow soap is the best known commercial name for the article, but if you can procure Babbitt's best soap in your locality you will be certain of having the right article.

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Vinegar for Sizing Whitewashed Walls.

What kind of vinegar should be used on old whitewashed walls preparatory to applying the glue size for kalsomining?

The vinegar should be full strength commercial quality, such as may be obtained in any good store. That which is usually sold as white wine vinegar is best.

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Alum in Wall Size.

A saturated solution of alum when applied to walls produces, after drying, a crystalline, glossy surface, which stops suction to some extent and therefore permits kalsomining or other water paints to flow more freely and uniformly when applied over it. However, a small portion of glue should be added to the solution in order to make it firmer and keep it from powdering on long standing, when dry. Not only does alum keep glue size from souring or molding, but it is also a destroyer of smoke. A soap size without alum or a subsequent coating with a solution of alum is liable to soften when kalsomine or other water paint is applied over it, and valuable time is lost if soap size is used without alum because of slow drying.

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Gloss Oil Size or Suction Varnish for Walls and Ceilings.

The so-called suction varnish or wall varnish or ceiling varnish is made by nearly all varnish makers to meet the demand for a means to stop the suction in plastered walls and ceilings. It can be obtained from first hands in barrel lots, at from thirty-five to sixty cents per gallon, according to quality, while in smaller lots, say five-gallon cans, the selling price is correspondingly higher. It is usually made from hardened rosin or resinate of lime, a small percentage of linseed oil and turpentine and benzine, or benzine alone, omitting the high priced turpentine. At the present cost of these materials, it would hardly pay you to go to the trouble of preparing it yourself, and we should advise you to purchase your needs from your nearest source of supply. We shall, however, for your guidance submit a few formulas for cheap wall varnishes. A good gloss oil size may be made by melting in a portable varnish kettle ten pounds ordinary rosin, to which on melting one-half gallon of raw linseed oil is added, into which mixture, on boiling, one pound of sifted air-slaked lime is stirred in small doses until all is taken up and a light brown semi-liquid resembling molasses and flour is obtained. When a little of this is taken from the kettle and put on a slab of glass, it should become hard and brittle, and at this stage the kettle is taken from the fire to a safe distance, where the now viscid mass is thinned with benzine 63 degrees Be., of which one gallon will be ample for the mixture of ten pounds rosin and one-half gallon of linseed oil. The raw linseed oil may be omitted and the rosin and lime only cooked together and then thinned with turpentine or benzine, but such a varnish will not work freely, and, on thinning, too much of the thinner is lost by rapid evaporation, making it really more expensive, though of quicker setting properties, than with the use of oil.

For a very cheap wall size the following is an excellent formula, but, of course, not as durable as the one given above. Into a suitable kettle place five gallons water, heat gradually, while adding seven pounds sal soda, to the boiling point; then put in slowly, while stirring, fifteen pounds rosin (pale grade I) in small portions. When all the rosin is dissolved, take from fire, strain through cheesecloth or muslin, while still warm, and let it become clear by settling. This will do to paper over or as a size for kalsomine, etc., where glue size is undesirable.

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Gloss Oil Size or Suction Varnish.

My experience has always been not to make experiments with substitutes. A substitute for a good article may answer for the time being, but it is well never to forget that the time comes when all things must be renewed, and then your trouble begins. The formulas given in the reply are only a temporary relief. We've had a lot of trouble trying to do work where these cheap gloss oils and suction varnishes have been used by painters who have worked there before us, because they will cause the new paint to peel off. We have come to the conclusion that the best thing to do and decidedly the cheapest in the end is to use a good hard oil finish with no rosin in it—a pure gum and turpentine oil finish—and coat your walls with that. If you use these substitutes they will get into the plaster and will give endless trouble, for you never can get rid of them. It is better to use a good glue size than a gloss oil, although a glue size will peel off if you get it too strong. My practice is to use the odds and ends of varnish that are brought back from the jobs we are working on, and to pour whatever may be left in the cans into a can and cork it tightly—you can put all the different kinds of good varnish together and then use it on the ceilings. It's a good deal better than leaving little remnants of varnish in the cans to get fatty and useless. But if varnish is too expensive, then a good coat of flat oil paint would be cheaper and in every way better and more satisfactory than one of these cheap gloss oils.

The Veteran Painter.

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To Prepare an Old Hard Finished Wall for Tinting.

First, remove any tint or kalsomine by washing or scraping until it is all removed. Second, if wall is cracked, scrape down or sandpaper the crack until both sides of the crack are level with the wall. Then open the crack slightly by running a knife or small trowel through the crack sufficiently to allow a filling of plaster of paris mixed with water, to which a small amount of glue size is added. After the plaster filling is dry, if there are any uneven places in the wall, sandpaper them slightly. Then size wall all over with either alum zinc or varnish size. When size is dry the wall is ready for tinting.

California Convention, 1908.

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Kalsomining New Hot Walls.

Ordinary glue size will often answer for new walls to be kalsomined, but it is safer to make a glue, soap and alum size, which is sure to give a good foundation. To do it properly, soak one pound of glue in cold water over night and pour off the water; then melt the glue in hot water. Slice a pound of rosin soap and dissolve in boiling water; also dissolve two pounds of alum in hot water. Stir the glue and soap together, then add the alum solution. Thin the mixture to the right consistency with water and apply it to the wall when cold. If one coat does not stop the suction, give two coats and touch up any porous places before applying the kalsomine. To make the latter mix twenty pounds best gilders' whiting with sufficient cold water to make a soft paste; beat out the lumps and let it stand over night. Soak one pound of good white glue in cold water over night and then melt it in the usual way. Dissolve one pound of alum and add to the whiting before the glue is added and if you wish to tint it, use colors ground in water and make your tint; then add the glue and thin the mixture with cold water until it is of the proper consistency for spreading. Should by any chance your kalsomine dry too fast you can slow it up by adding glycerine, say one or two ounces to the gallon.

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Kalsomine That Will Keep in Hot Weather.

I notice that recent writers on the subject of kalsomine recommend soaking the glue over night and drawing off the surplus water before melting. Is not the strength of the glue thus thrown away? Also in most recipes the proportions given are one pound of white glue to twenty or twenty-five pounds whiting. I use XXXX Philadelphia Gilders' Boiled Whiting, and a good grade of gelatine, uncolored glue, aiming to obtain that which has little or no grease. Two hundred pounds whiting and five and one-half pounds glue are mixed separately in water and allowed to soak over night, and next morning both are heated to the boiling point with steam and then mixed. To keep the glue from souring a preservative is used, and when so prepared the kalsomine will keep for six weeks in summer in good condition.

L. C. R., Denver.

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Size and Kalsomine for Sand-Finished Walls and Ceilings.

We do not know of anything better than glue size for sand-finished walls and ceilings; the size to be made as follows:—Dissolve one-half pound of white sheet glue by soaking it in cold water until soft, then pour on hot water until it is dissolved. Slice one-half pound of rosin soap and dissolve in hot water. Dissolve one pound of alum in hot water, then stir the solutions of glue and soap together and add the solution of alum. Finally thin the mixture with enough water to proper working consistency. While often a simple glue size is sufficient, this special size is best for a good foundation for kalsomine. After this size has been applied and has dried and hardened, knock off any rough sand that may protrude through the size with coarse sandpaper before kalsomining. A first-class kalsomine is prepared by soaking over night in cold water sufficient to cover it one pound of best white sheet glue or uncolored gelatine glue. Thirty pounds of English cliffstone, Paris white, bolted fine, or extra bolted gilders' whiting, is soaked in sufficient water to make a paste. Next morning both the glue and whiting paste are separately heated with steam, or over a moderate fire in a water bath, to the boiling point, and when the glue is well dissolved it is added to the whiting and both materials thoroughly mixed. More hot water is added, until proper consistency is attained, and on using it may be still further diluted with cold water, if necessary.

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To Keep the Edges of Kalsomining from Drying Too Quickly.

Always finish lightly with the point of your brush. If any edge dries, stop and wet it with a clean brush and clear water; if careful you can join to it without showing "laps." If you find that you have missed any spots, wet the edges the same way and carefully touch them up with the kalsomine.

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Mixing Fresco Colors in Water and Oil.

For fresco-secco and true fresco painting, colors ground into a pulp with water, the so-called colors in distemper are selected, and these must be ground without size of any kind. The binding medium is milk of lime or lime water, hence caustic, and therefore only earth colors, ultramarine blue, etc., may be employed, while Prussian blue and kindred pigments must be omitted. While the grounds are moist when these frescoes are applied, or must be moistened, the pigments are thinned with milk of lime or lime water, or barytes water, either of which will serve as a binder, because in these methods the colors will become a

part of the work itself. In oil or spirit fresco the binding material for the colors must itself be insoluble in water. The painting ground must be dry and free from alkali and soluble salts. It should be gone over with oxgall and water before commencing to paint. In order to ascertain whether a plastered wall is dry enough to be painted in oil or spirit fresco, the gelatin test is employed. A small oblong piece of colored sheet gelatin is held firmly against the wall by means of a stick at the center. If the wall is as dry as the air of the room, the gelatin will remain flat; if more moist than the air, the sheet will curl outward. If a wall that apparently still retains some alkaline properties must be painted, it is best to give it a coat of warm linoleic acid by means of a large flat wall brush.

The best medium for oil fresco is said to be four ounces hard paraffine wax, dissolved in twelve fluid ounces of oil of turpentine in a water bath to which, when perfectly clear, are added sixteen ounces of hard copal varnish, which medium is further diluted with oil or spirits of turpentine.

The spirit fresco medium, according to Gambier-Parry, is prepared by warming eight ounces oil of spike in a glass flask at 80 degrees C., and adding two ounces, by weight, of elemi; the mixture is kept warmed and occasionally shaken, until the elemi is dissolved. Now while still warm, the solution is filtered and on the filter two ounces of turpentine, warmed to 80 degrees C., is poured, and the united filtrates thoroughly mixed. The liquid is poured back into a flask and warmed again to 80 degrees C. (176 degrees F.), and four ounces, by weight, of pure white wax, previously melted, are poured into the solution of elemi, and the whole thoroughly shaken until the mixture is completed. The sixteen ounces of copal varnish is gradually introduced under constant agitation, and the water surrounding the flask made to boil for five minutes. This done, the flask is withdrawn and allowed to cool, but the mixture must be stirred from time to time. When it becomes treacly in consistency it is poured in small, wide-mouth bottles and well corked.

When used for thinning the colors, turpentine should be added in order to make the paint work freely. While Gambier-Parry advises that the pigments should be ground in his medium, we think that this is unnecessary, and that colors ground fairly stiff in drying oil will serve the purpose very well.

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Mediums for Preparing Distemper Colors for Frescoing.

What should distemper colors be mixed with for fresco work?

The term fresco really means that the water color is put directly on the wet stucco or plaster; but painting in distemper is often called frescoing in this country. To meet with success in painting plastered walls in distemper, a size should be applied which is best made as follows:—

In twenty gallons of boiling water dissolve three pounds of sal soda and one pound of borax, then add to this solution, while still boiling, under constant stirring, five pounds of pulverized rosin that has previously been mixed with two pounds of benzine. Keep boiling and stirring until the rosin is dissolved. This composition is set aside for future use, as it will keep for all time. One pound of it dissolved in three and three-fourths gallons of soft water is mixed with a glue solution previously made by dissolving ten pounds of pale glue in three and three-fourths gallons of water, the whole boiled for ten minutes, then run through a cheesecloth or fine strainer and when cold it will serve as a size for walls to be painted in distemper or other paint.

As to mixing colors and tints for painting in distemper, buy only such as have been ground in water only without size. Procure genuine English cliff-stone, Paris white or bolted gilders' whiting. Soak twenty pounds of this in soft water over night, also soak one pound of white sheet glue or gelatine in enough water to cover and next morning melt your glue in the hot water bath. If you have a job in white, stir the dissolved glue right into the whiting and thin with water to the desired consistency. If you wish to make a tint, mix your color, previously thinned and beaten smooth with water, with the white

until you have the right shade, then add the glue size. If the distemper color does not break up smoothly, add a few drops of glycerine, which will do no harm. For lining up, a little glycerine or oxgall added to the color will make it work well.

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Specifications for Painting on Plaster.

In Kidder's Hand Book the following specifications are given for painting on plaster:—"All plaster should be filled, whether oil or water paint is to be used as a finish. The best filler to use is a medium grade of varnish, thinned with turpentine or gasoline. This varnish size makes the plaster almost, if not quite, impervious to moisture and is therefore superior to any filler that contains water. If water paint is used and has at any time to be removed it is necessary to first clean the walls of all old paint, and if the varnish filler has been used, the paint can be sponged off without destroying the size.

"Oil paint for walls. The best wearing and best appearing wall finish is by all means that obtained with oil paints. Nothing but white lead should be used for the body of the two or three coats, tinted to approach the desired color, and for these coats nothing but linseed oil should be used as the carrier, with a very small proportion of turpentine added as drier.

"If the walls are well filled three coats should be sufficient as ground work. The last coat should contain nothing but turpentine and the color desired, and this coat should be applied while the last coat of ground work is still 'tacky' and should be evenly stippled with a stippling brush as fast as it is applied. When dry it should be absolutely flat and present a beautiful velvety finish. It can be easily washed with a damp rag at any time when dirt or dust has accumulated."

A firm of architects wrote:—"Our painters object to some points and we would like to learn your comments on its provisions. Our leading painter here insists on the following as the proper method:—

"Prime plaster walls with a coat of white lead and linseed oil. On this give a coat of glue size and then two coats lead and oil, stippling the last coat as fast as applied"

Your leading painter evidently follows the advice given by the late V. B. Grinnell, of Waterloo, Ia., who in his hand book on painting, under caption *How to Paint a Plastered Wall*, suggests this as a good and economical method.

We agree with Kidder that a varnish of medium grade, the so-called hard oil finish, reduced with turpentine or benzine (not gasoline), according to the suction of the wall, is the best wall sizing next to pure kettle boiled linseed oil, but for economical reasons the pure lead and raw oil priming suggested by Grinnell and following with a coat of good glue size deserves recognition also. As a matter of fact the writer has been watching for the past fifteen years the plastered walls in an office building erected at that time, that were still fairly hot when painted with three coats of a paint tinted to light cream color and which consisted of equal parts white lead and zinc white in oil, thinned with eight parts raw linseed oil, fifteen parts turpentine and five parts pale japan drier. These walls have been washed repeatedly with soap and water, do not show any cracks and the paint still shows up with a fair gloss. For the priming the paint was reduced with one-half its volume of raw linseed oil, but no size was used at any stage of painting. We do not quite agree with Kidder about the stippling on the last coat while the previous coat is still "tacky." Every coat must be dry before another is applied wherever oil paint is used. Neither can an absolutely flat paint produce a velvety finish. The stippling coat must be very stout, mixed from lead or lead and zinc ground in oil, thinned with one part of oil, one part japan and five parts turpentine. Turpentine is not a drying medium for oil paints, but simply a medium for flattening paints or colors.

We would suggest the following as the proper specification for wall painting in oil for flat finish, new work:—

First coat. Pure lead in oil, tinted same as for finish but darker in shade,

thinned with pure raw linseed oil and not over 10 per cent. of turps or benzine to make it penetrate into the plaster.

Second coat. Extra hard oil finish, pale or white or light tints, medium for dark tints, thinned with pure turpentine (or benzine); three parts varnish, one part thinner.

Third coat. Pure lead in oil, tinted a trifle lighter than first coat, thinned with five parts raw oil, two parts turps and one part drier.

Fourth coat. Equal parts pure white lead in oil and pure zinc white in oil, tinted to suit and with one part oil, one part drier and five parts turpentine, stout enough for stippling.

For gloss finish. Same directions as foregoing, omit stippling and apply fifth coat as a gloss finish. French zinc white in damar varnish, tinted to suit, thinned with best white enamel varnish.

A Denver, Col, painter wrote as follows:—"In this part of the country, in painting walls, we usually put on one coat of oil paint, then one coat glue size, then one coat about half and half, rather more oil than turps, then one coat dead flat stippled, and if an extra fine job is wanted we stipple the last two coats and give an extra coat, but the last coat is flatted with turps. An out-of-town concern has been doing several jobs here and putting the last coat on quite oily, which in many cases left the cracks and some spots showing dead; then they go over the entire surface with a preparation which is transparent. It looks like starch which is used for laundry work. This, when dry, makes the entire surface look just like a good job of distemper tinting, only that it looks a shade more glossy, making a very soft effect. And I want to know what the stuff is they use, as they will not tell.

No one that we have found is aware of the preparation referred to by our correspondent. It may be starch such as is used by the Chinese laundrymen, to which stearine or spermaceti has been added, or starch to which starch gloss (lustrine) has been added. The latter is made as follows:—Two and one-half ounces each powdered borax, gum arabic, spermaceti and six and three-quarter ounces refined glycerine are added to two and one-quarter pints of filtered or distilled water and gently heated until all are dissolved. This may be scented by a few drops of oil of citronella. To six and three-quarter ounces of boiling potato starch six tablespoonfuls of starch gloss are added. It acts as a binding and glossing medium, and may be the very thing, as ironing is required to bring out the high gloss on laundry work while on a wall it would have a sheen only.

In Cincinnati, and some other soft coal burning cities, it is customary to stipple oil-painted walls with a coat of starch. When the smoke from the air has made the surface grimy, the starch can be washed off, carrying the dirt with it. Again stippling the wall with starch makes the paint appear as good as new.

We have received the following suggestion from John Cummins, of Cincinnati, O.:—

"To produce a semi-flat finish over an oil paint that is glossy, all he has to do is to put a small quantity of beeswax in his old paint, and it will flatten nicely, leaving a waxy finish. But what I think he refers to is this:—Coat up the walls with as many coats of oil paint as may be necessary, using paint quite heavy and stippling same. Have last coat rather flat. Then go over the walls or surface with corn starch, boiled, same as is used for laundering purposes, stippling this also and he will have the finish he is looking for. Ordinary laundry starch will do as well, and he can produce a flat surface with this over a gloss finished wall also. This preparation will preserve the paint for many years. When the walls get soiled the starch preparation is washed off with warm water and wiped dry with chamois, leaving the paint as fresh as when it was put on. Then go over it with a starch preparation again, and so on indefinitely.

A Pittsburgh decorator suggests the use of buttermilk. Strained through cheesecloth to flatten his wall work. Sweet milk, he adds, will do as well. It should be brushed on with a large kalsomine brush the same as kalsomine, only not so freely. It forms a transparent film that comes off with the dirt, if the wall ever requires washing.

—696—

Avoiding Laps on Flat Finish Walls.

A painter asked how to put a flat finish on the wall of a room and avoid laps. Also how to varnish over this to give it a fine appearance.

We will take it for granted that the question refers simply to the last coat of paint, which you desire to be dead flat, or nearly so, and, if such is the case, would suggest that you first sandpaper the previous coat smoothly and thin your paint for the flat finish with a mixture of eight parts of turpentine, one part linseed oil and one part drier. When so thinned it should not produce laps, if applied diligently. Before varnishing, moss down the flat finish with No. 0 steel wool.

My experience has shown me that the best way to do this is to put about a tablespoonful of any good varnish in the flat color and have a man follow right after the brush hand with a stippling brush, so that no laps will show. In my opinion all wall work ought to be stippled. It costs but very little more and certainly makes a better job.

The Veteran Painter.

—697—

Painting Plastered Wall in One Coat.

A Denver painter wrote:—"I have some walls to paint one coat and must not show those small cracks. Looking at the wall before painting it, the cracks are not visible, but after the paint goes on they'll show up. Now what can I do with that in an inexpensive way, as it calls for one coat work and it is stipulated that the cracks must not show?"

It is attempting an impossibility to try to paint a wall with one coat so that these fine cracks will not show. No painter ought to undertake to do work under those conditions, because it cannot be done. As soon as you put on a coat of paint, the cracks will suck up the oil and there will be a wide space alongside the crack that is perfectly dead. Sometimes shellac is used to kill those cracks, but in two or three months every place where the shellac has been used shows up worse than before. An inexpensive method was asked for and shellac is certainly not inexpensive. Usually a painter expects it to require from three to four coats of paint to hide the cracks. The cheapest thing to do would be to first give the wall a coat of oil, turps and driers, but in no pigment, and coat the whole wall with this. By doing this you will supply oil to the cracks and reduce their suction. Then you may possibly be able to cover it with one coat so that the cracks will not show, but I would not like to guarantee even then that you could do it with less than two coats. It is a great harm to the trade to have painters accept work under impossible specifications, for it educates people up to demand more than can be accomplished, and they are only willing to pay for what they specify and not for what the painter is required to do in order to give satisfaction.

The Veteran Painter.

—698—

Preparing Painted Walls for Repainting.

The first thing to do is to dust the walls thoroughly and if greasy or smoky, as in kitchens or public halls, they should be washed down with soap suds, to which a little ammonia may be added, then rinsed with clear water. Cracks in the walls should be cut out in inverted V shape and filled with calcined plaster up to within one thirty-second of an inch of the surface, and when the plaster has become hard, the remainder may be filled with hard putty made from white lead, whiting, coach japan and varnish. This, when hard, should be sandpapered to make it perfectly even with the wall. This material should be coated with color to match the old paint, otherwise the filled in crack will show through the new paint. The above refers to repainting in flat or glossy oil color. On old

kalsomined walls, it is best to wash off the old paint with warm water, but if this is too troublesome and the old paint fairly firm, a good coat of glue, soap and alum size or glue size alone will make a good foundation for the new paint.

—699—

Washable Gloss Paint for Walls and Ceilings.

What paint is best for kitchen walls and ceiling that dries with gloss and which is not destroyed by repeated washings?

The best method is to paint in flat finish with oil paint and over this apply good interior varnish. Or ground up with flat coats and finish in enamel paint. Either of these is washable, and if the walls become dull from oft-repeated scrubblings one coat of varnish will restore the gloss. Distemper color may also be used on kitchen walls and ceilings, but a coat of silicate of soda (soluble glass or water glass) should be applied as a finish.

—700—

Painting the Sand Finished Walls of a Storage Battery Room.

Advice was asked as to the proper materials to employ on the sand-finished walls of an engine and storage battery room; in order to have the paint unaffected from the acid vapors of the battery room. The inquirer's idea was to give a coat of hard oil finish to stop suction in the wall, then give a coat of pure white lead, thinned equal parts oil and turpentine to a stout paste and reduce to brushing consistency with a pale varnish.

If the wall is new and still hot, we would advocate a coat of vinegar, letting it remain for forty-eight hours, then give a coat of raw oil, to which only enough white lead has been added to color it. If the wall is to be in color, add enough color to make succeeding coats cover well and give a coat of thin glue size or suction varnish, applied uniformly. Do not use any white lead at all, but make the next coat of zinc white, ground in oil; tint, if it is to be colored with oil colors and thin with one-third raw linseed oil and two-thirds turpentine, adding some pale japan drier. For the final coat we would suggest zinc white, ground in damar varnish, if the job is to be in white, thinned to creamy consistency with turpentine, to which a good hard gum varnish of pale color is added for free spreading and glossy finish. If the job is to be finished in tint, zinc white in oil, and colors in oil as needed should be broken up with a good japan drier and some turps; and a good hard and fairly quick drying varnish added to produce a glossy finish, that is washable. The use of white lead, as well as the use of much linseed oil should be avoided on a job of that class, both being readily destroyed by the vapors of sulphuric acid.

—701—

Oil Paint for Combing on Walls.

Paint for this purpose is made from pure lead in oil to which a certain portion of bolted whiting is added in order to keep it from running together after it has been combed. Thin stiff ground white lead with equal parts of raw oil, drier and turpentine to a stout semi-paste. Add your tinting color, which has been broken up in raw oil and turpentine, equal parts to similar consistency. Mix all well together and add a small quantity of fine bolted whiting. Put all through a paint strainer to avoid lumps and finally add a small portion of rubbing varnish to give clear lines in combing.

Here is a formula for roughing—it should be made thinner for combing:—One-half gallon raw oil, one and one-half gallons japan, one-half gallon turpentine, fifteen pounds plaster, twelve pounds whiting, twelve pounds white lead, twelve pounds dry ocher.

That's as good a roughing as ever was put together. He can thin it for combing.

The Veteran Painter.

—702—

Paint for Stippling on Smooth Plastered Walls.

For rough stipple, mix your paint from equal parts of white lead in oil, zinc white in oil and dry plaster of paris (the latter of finest grade). Thin down with raw linseed oil and turpentine in equal parts, adding two tablespoonfuls of pale japan to each pint of the liquid. Make the paint just stout enough to apply with a wall brush and put it on in that consistency. When the surface has been so coated and before the paint begins to set, use a good size stippler, and see that you do the work uniformly and evenly. You can color the white to any desired tint with finely powdered dry color or you may use color ground in oil, but if much of the latter is required, use one-third raw oil and two-thirds turpentine for thinning. When solid color is desired for wall stippling, use colors ground in oil and finest bolted whiting, dry to make a stout paste. Thin this paste with one part oil and three parts turpentine and add one part japan. When the paint is applied in stout consistency, it may be stippled or combed and very pretty effects are obtained. Before applying the stipple to unpainted walls, two coats of pure lead in oil should be given.

—703—

Killing Dampness in Walls.

A painter had occasion to decorate a brick church where the walls were damp and spotted in places, and he wanted a remedy. He had tried shellac and other things, but had found no remedy.

Mr. Pedretti said there were all kinds of recipes for killing damp spots. Shellac was a bad thing to kill damp spots, because it is affected by wet. He finds it necessary to give the wall a new surface, and uses a size of glue, plaster of paris and alum, run over the whole wall and after it is dry, he then sizes with glue or alum size. If that don't kill it, then nothing will.

Ohio Convention, 1904.

—704—

Stains Caused by Smoke, Dirty Bricks or Bark on Laths.

A gentleman in the country has had a handy man, not a real mechanic, do some work on an old house that has been lived in for a good many years. The kitchen opens into the dining room, and that in turn into the parlor. The people who have lived in the house have not been at all careful, and have burned oil stoves and lamps, and probably have allowed them to smoke a good many times. At any rate, the ceilings in all these rooms were pretty badly smoked up. They were plastered, and the smoke naturally soaked in. This man first washed the ceilings off well with soap and water and scraped the smoke stains off pretty well. Then he gave them a coat of one of those prepared water paints, but by some mistake the owner had bought a material intended for outside use instead of for whitening ceilings, and it peeled off. Then the owner asked the manufacturer of the paint what to do, and he recommended the use of one or more coats of a cold water white that he made for use on ceilings. But he did not know anything about the smoke stains, and as any man who had any practical experience would know, the stains showed through the second coat of this prepared kalsomine. They then asked whether a third coat would make the ceiling white. To which the reply was given that in my opinion they might keep on piling one coat on top of another and that the stains would still come through, and from my own experience I knew that it is almost impossible to kill smoke stains, and I feared that whatever might be done would, in the end, prove unsuccessful.

You are right in thinking that it is almost impossible to kill smoke stains. I have seen them come through wall paper or paint, although just how soon will depend on the nature of the covering. To gild the surface with gold leaf

seems about the most effective remedy, but it is too expensive to use, except for small patches. A smoky brick in a chimney breast will keep right on discoloring the paint or wall paper for years, in spite of every effort to kill the stains. There's no real remedy but to cut the dirty brick out and to put in a clean one. And it is the same way with a lath with the bark on. The stain from spruce bark will come through plaster, paint, paper or almost anything you can put on. A wall or ceiling will discolor in small spots because of sap in the laths. The only real cure is to get right down to the foundation of things and cut out the offending cause. In the case of the ceiling spoken of, probably in an old house like that, the whole body of the plaster is more or less saturated with smoke and dirt, and it will be impossible to do anything with it that will make a really first-class job, unless you replaster the ceiling. Even if there was some way to cure the evil a handy man would probably not understand exactly the method described, and you could not be certain he would carry out your directions, and then if your method went wrong you would be blamed, and not the lack of skill of the man who was applying it. It does not pay to hire any but the best mechanics and to use the best material. *The Veteran Painter.*

—705—

To Cure a Soft Spot in a Wall Where Paint Will Not Dry,

A New Bedford painter was called upon to remedy a bad spot in the side wall of a reception room of a public institution, where the paint had peeled shortly after application. The wall is of brick and about eighteen inches in thickness. He removed the paint with a paint remover and waited for some weeks for the wall to dry out, but found that the party who painted it previously had used asphaltum or something of that nature for a backing, and the wall not only felt wet, but sticky also, and this sticky substance seemed to come through. Would like to have our advice in the matter.

It strikes us that the painter who painted the wall before found the wall to be damp and used asphaltum varnish to hold back the moisture, as a good many did before him and failed. The dampness, no doubt, also caused the paint to peel. The only course to pursue is to demand from the trustees or whoever has charge of the building, a thorough examination into the cause of the dampness, and that the same be remedied, before going any further. Then it will be necessary to remove what moisture still remains by the use of the paint burner. Nothing, not even sheathing with lead, will keep back the moisture, unless the cause producing it is removed. It may be caused by a defective gutter in the roof, or a leaky spout, etc. The stickiness of that spot can be cured by the application of several coats of shellac varnish, but this will not hold back the moisture. Before any work is done in this case it should be clearly understood that the painter is not responsible so long as these conditions remain.

—706—

Paint for Damp and Mouldy Walls.

A formula was asked for a paint that will prevent dampness and mould on the outside of a wall from penetrating through the paint coatings on the inside of the wall.

Such a paint can be made by first preparing a liquid as follows:—Fifty pounds air slaked lime, 10 pounds glucose, $2\frac{1}{2}$ pounds powdered alum, 2 gallons boiled linseed oil, 5 pints oil of eucalyptus are placed in a small barrel or tub and 8 gallons of warm water gradually added, stirring in the meantime, until all is dissolved. If this liquid is too stout to work freely, more warm water is added. Any lime-proof pigments, such as zinc oxides, oxide of iron reds, ochers, umbers, lime blue, etc., may be mixed with this liquid and applied on the inside of such walls as you mention, but at least two coats are required to obtain the desired result. From three to four pounds of pigment are required to the gallon of liquid, excepting in the case of umber or lime blue, where one and one-half to two pounds is ample. If this damp resisting paint does not give the result looked for the remedy must be applied from the outside of the wall.

—707—

To Prevent Moisture in Ceilings, Also to Kill Saltpeter.

Writing in December, a New York painter said:—"In a building erected last winter, the ceilings were prepared and decorated in water color, but in the course of two months, the moisture from fireproof brick has come through. I washed off one ceiling and applied two good lead coats and redecorated it, but in a month's time the moisture came through again. Would like to know best possible preparation to kill moisture and saltpeter."

There is only one way to kill moisture and that is to keep it out. Moisture arising in rooms from vapors can be prevented by ventilation, but moisture coming through brick walls or brick floors must be cured from the other or opposite side. Have the bricks non-absorbent, then use a good size before repainting the ceiling. Two coats of ceiling varnish or suction varnish will do. To kill saltpeter, builders' acid (hydrochloric acid, commercial quality) is used with good effect. It should be applied with a cheap fiber brush or cotton waste tied to the end of a stick. If the mortar in the joints should be affected by the acid, go over the joints carefully with ammonia

—708—

Dampness in a Kitchen Ceiling.

New York City decorators had a hospital kitchen to repaint where cooking is going on most of the time. The ceiling is of various heights and was found to be very much discolored to a brown yellow from surrounding buff tint. Before repainting, it was washed most thoroughly with soda water and well rinsed with clear water and painted in the ordinary way with oil color, composed of white lead and yellow ocher. After the end of two weeks the paint was dry and hard in some places, but on other portions still wet. Removing the wet paint with turpentine, it was painted over with paint that contained large quantities of driers, but with like result. The sizing with plaster in size did not remedy the trouble. They wanted to know what could be done to overcome the difficulty.

So far as we can see, there are only two solutions to the trouble. Either the plaster on the higher places of the ceiling has been so much saturated and softened by the constant vapors arising from the cooking ranges that the paint or size cannot possibly dry on that part of the ceiling, which may be greasy in addition to being soft, or there are leaks from one cause or another at the particular patches or spots, probably from defective drainage pipes overhead. Kalsomine or sizing will not remedy the evil, as glue will only swell, but not dry under such conditions, nor will shellac or other varnish dry hard, and oil paint certainly cannot dry at all. Before a remedy can be applied, the cause must first be discovered. If not due to leaky pipes over the ceiling, better ventilation is the only remedy.

—709—

Lake Coming Through Subsequent Coats.

A Pennsylvania painter wrote:—"I was called upon to retint a room that I had tinted some two years previous with damask lake. I did not care to wash it off, so to make sure of a good job, I painted the walls with a white paint half turps and half oil. My reason for using white was I had to tint the walls a cream shade. After the paint was dry, I mixed up the kalsomine and tried a panel, and, to my surprise, that lake began to bleed through the paint, and it looked as if some one had been trying to do a job of marbling and made a failure. I gave it one more coat of paint, and, after twenty-four hours, tinted it and that made a good job. Now, tell me, what would you have done?"

The coat of paint ought to have stopped the lake from showing through, or a coat of hard oil finish should have stopped it. It seems to be something like

the way graining will show through paint. If you want to cover up a grained kitchen with paint you will find that the lights and shades of wood that has been grained oak will show through two coats of paint. It is somewhat like a piece of new clapboard, which will show through the paint unless it has been brought up with the same number of coats of paint that have been used on the old boards.

It might have been that the wall was cracked and had not been properly filled and that the lake color came through along the cracks. But it would seem that the best and the cheapest thing to have done would have been to have washed off the lake in the first place, and saved the cost of trying to overcome the difficulty of its coming through. When a painter tries to save himself washing off old kalsomine or scraping off an old wall paper or removing old paint or varnish, it always reminds me of a man who tries to save himself some walking by cutting across lots, only to get up to his middle in a swamp. I have more than once seen a red wall paper that some paperhanger thought he could paper over without scraping off come right through a light colored paper that has been hung over it, and come through in spots, too. A good many painters would have used a cheap rosin varnish to size the wall with, but that would make more trouble than it's worth. I tell you, it is cheaper in the end to pay four dollars a gallon for a good oil finish than to use one of those cheap rosin and benzine varnishes.

—710—

Spotting and Discoloring of Walls and Ceilings in a Hospital.

On June 1 a Massachusetts painter finished repainting the operating room in a hospital. On July 1 the walls and ceiling, that were painted pure white, had turned to cream color in streaks and blotches, while the woodwork, also painted white, had become yellow in some places, gray in others and some remained white. Before repainting the walls and woodwork had been finished in white enamel years ago and were somewhat checked and yellowed, while the ceiling and cornice were in fair white condition. He refinished the ceiling by giving one coat flat white lead and a second coat of white lead and zinc, stippled. On the walls and woodwork one coat of a well advertised enamel white was used by request, but as this did not seem to be any better than a white enamel paint used in other rooms, he used the latter for second coat. Would like to know the probable cause of the discoloration, also the remedy, as he is afraid the spots may come out again when done over.

This is a knotty problem for the reason that two different kinds of enamel white were used on walls and woodwork. We happen to know that the enamel used for first coat is somewhat difficult to apply, and it is just possible that in some places it was laid on in a thicker film than in others, hence did not dry all through before second coat was put on. We do not think that there is anything in the enamel used for second coat that would be affected by the use of the sterilizing boiler used daily in the room, especially as it is dry heat only. It is different with the white lead used on the ceiling, as white lead is readily affected by even low degrees of heat in interiors and the small portion of zinc added would not overcome it. We rather think that the cause of discoloration has its source in deposits of some vapors of disinfectants, etc., used in operating rooms, and which had not been dislodged in cleaning the surface preparatory to repainting. If this be so the only remedy to hold back the stains would be the application of a thin size, say bleached shellac varnish, reduced somewhat with alcohol, applying another coat of white enamel over this on woodwork and walls, and a coat of stipple made from zinc white only for the ceiling.

—711—

To Make Plaster Paris Set Slow.

Add to the dry plaster before mixing with water from 2 to 4 per cent. by weight of finely pulverized marshmallow root, and you will find that it will

require a full hour for the mass to set hard. Not only that, but you will also find that the mass, when dry, can be sawed, filed or turned off and that it will not shrink, crack or brittle. If 8 per cent. of the root, by weight, is added, it will require from two to three hours to set, and the mass will be still harder when dry. When colors are added to the mass, a fine imitation of marble can be had, or if formed into tiles these may be painted, polished or varnished.

—712—

Combed Walls—How to Mix Paint Properly for the Work.

The walls of a bath room are to be painted sky blue and combed.

It is best to use pure white lead, ground stiff in oil, thin with equal parts raw oil and turpentine to a fairly stout batter, add your blue, already broken up in turpentine and some paste drier, the liquid drier being liable to make your paint too thin. If you choose, you can add some fine bolted whiting to your paint to make it stout, but in that case you must strain it well before use. If you use Prussian blue, omit the whiting, because it is liable to give a greenish effect, and substitute zinc white to body it up. Before you begin, try a little patch to see whether your paint will give the proper thickness of film for combing and whether it holds up after combing and does not run over the furrows made by the comb. A little rubbing varnish added to the paint will aid in drawing clear lines with the comb. Above all, try your paint first on an out of the way space of the wall.

—713—

Efflorescence in Rough-Plastered Walls.

Paint peeled in large blotches from a roughcast wall of a building in two years. The wall was thoroughly dry and had been on nearly two years. The paint was first class and well applied in two coats—buff color, made from pure white lead and French ocher. Wherever the paint peeled there was a saltpeter-like spotting on the plaster.

It is a difficult matter to prove that the salt-like material which has pushed away your paint is really saltpeter, which seems to be the name which is, by common consent, given by painters to all the efflorescence so frequently noted on stone or brick walls, even after they have stood for years. We have noticed this on buildings that did not show it during the first ten or fifteen years after erection, and then, after every driving rainstorm, this white efflorescence became more and more prominent. When this occurs many painters are nonplused as to probable cause, but it is an entirely natural phenomenon, a body which was part of the clay out of which the bricks were made and which burning in the kiln was unable to remove. When the stones or bricks become saturated with moisture the mineral salts are dissolved and force themselves to the surface. As in the case of the bricks, so it is with plaster; the surplus mineral salts in the lime and cement are also dissolved by moisture and forced out, and this causes the lime, cement and brick to become harder with age. We, therefore, believe that, in spite of your belief in the dry condition of the wall, there was moisture present, and no one can blame you or your paint for the trouble.

There has been so far no paint invented which will prevent walls from giving off efflorescence in the presence of moisture.

—714—

Stopping the Suction in Plastered Walls.

Where glue size will not stop the suction in walls or ceilings, a varnish size is the best remedy. Take good hard oil finish or copal varnish and thin it down with an equal measure of turpentine, or if this be too heavy, use two measures of turps to one of varnish. The condition of the surface must guide

you in preparing the size. It must be so thin that it will dry flat, or very nearly flat. You must also see that the size is dry and hard before applying the paint, otherwise it may crawl or crack.

—715—

Various Ways of Painting Plastered Walls.

If you wish to paint whitewashed walls or ceilings in oil or water and make a durable job, soften the whitewash with a wash made of one pound potash, dissolved in ten quarts of soft water, applying it repeatedly over the surface with a large sponge, then scrape off. However, if the whitewash adheres well, you can save yourself the expense of removing it, and bind it with a glue size, over which you may put your kalsomine without risk of its coming off and taking the old whitewash with it.

The glue size must be made from good white sheet glue, one pound, one pound good white bar soap, two ounces of alum. First soak the glue over night in enough water to make a jelly, then melt it in a water bath, adding from one to two quarts boiling water. Dissolve the alum and soap each separately in a quart of boiling water, and when all are thoroughly dissolved, mix the glue and soap water; then add the alum solution slowly, stirring during the operation. Finally add one gallon cold water. In order to make it penetrate, it must be applied warm, or it will not hold the whitewash securely on the wall. This is for kalsomining or water color painting only; for oil painting the whitewash must be removed by all means. In the latter case, apply a thin coat of white lead priming, say about ten pounds of keg lead to seven pints raw oil, and one pint turpentine and drier. When this coat has become hard, give one coat of glue size, which will save you two coats of paint.

This glue should be made in the usual way from good white glue to a fair consistency, and when nearly cold, one-half ounce nitric acid should be added for every pound of glue used, which will keep it liquid and prevent it from spoiling. In place of nitric acid, double the quantity of acetic acid may be employed.

When the glue size has dried hard, as many coats as are necessary to cover up uniformly are applied, using white lead in oil thinned with raw oil and turpentine, finishing in either white lead or zinc, tinted to suit, flat or in gloss. This applies to newly plastered walls, as well as to whitewashed walls, and while kitchens, halls, etc., should be in gloss, we think the walls and ceilings of churches, school houses and other public halls look far better when painted flat with a faint eggshell gloss finish. When old painted walls that are very dirty are to be renovated, dust them carefully, then scrub the same with soap and water, to which a little ammonia has been added; then follow with sponge and clear water, wiping up with dry sponge or cloth. In repainting, cracks must be filled in and touched up.

If you desire to kalsomine whitewashed or newly plastered walls, prepare the kalsomine or water color as follows:—Soak over night one pound of good white sheet glue in cold water. If there is too much water, pour it off, then dissolve the glue in the usual water bath. This will be sufficient for twenty pounds of best gilders' whiting, which should be mixed with water to a stiff batter, to which is added one pound of alum, dissolved in hot water. Before the glue is added, the tinting colors should be added to the whiting, and such colors should be ground in water, as dry colors will streak. Test the mixture on a piece of white paper until you have the desired tint or shade.

When you have the proper tint, add the glue and test to see whether you have enough binder, and if not add more glue, then set aside to cool. Remember that you must have enough binder so that the first coat will not rub up when applying the second.

For a clear white job, add a little ultramarine blue; for a blue tint, use more ultramarine. Do not use Prussian or Chinese blue, as it is apt to green off. For a light green tint, use chrome yellow and ultramarine blue, and for terra cotta tint, use light Venetian red.

As to our opinion on the respective merits of oil colors vs. water color paint-

ing of walls, would say that it is a question of first cost, kalsomining being much the cheaper of the two methods, while oil color is the more durable. When oil color becomes stained from leaky roofs, smoke, etc., the surface can be cleaned down and look as good as new, while stains in kalsomined walls cannot easily be removed.

—716—

Size for Rough Plastered Wall that Will Prevent Water Colors from Spotting Out.

The best cheap size for plastered walls that are to be painted in water color is made as follows:—

Dissolve in five gallons of boiling water twelve ounces of sal soda and four ounces of borax, then, when the crystals are fully dissolved, add, while stirring, one pound of window glass rosin that has been dissolved in eight ounces of benzine, boil all until the rosin is dissolved. Thin one pound of the resulting composition with three and three-fourths gallons of soft water and mix the solution so made with a solution made by dissolving two pounds of glue in four gallons soft water and boil the two solutions together for thirty minutes, then run through a paint strainer.

Or you may use so-called suction varnish or wall varnish, which is sold at a low price for this very purpose by many varnish makers. Soap and alum size is not the proper material for rough plastered walls and a coat of boiled linseed oil is preferable by far.

—717—

Dull Finish for Rough Plastered Walls.

For cheap work size the walls with a wall or suction varnish, then apply one coat of oil paint, a mixture of equal parts pure lead and pure zinc in oil, thinned with three parts raw linseed oil and one part turpentine and drier in equal portions. Have this mixture tinted with oil colors, same as the finish desired. For the finish use zinc white ground in oil, tinted to suit, and thin with one part raw oil and three parts turpentine with sufficient japan drier. Have this paint stout and stipple it, as in this way you will have the best, most uniform, effect. Another method is to thin down pure white lead in oil with raw oil, not over ten pounds lead to one gallon of oil, adding a trifle japan, applying this direct to the plaster. When dry apply a coat of glue size prepared as follows:—One pound good white glue dissolved in one-half gallon of boiling water, one pound good bar soap dissolved in one quart boiling water and two pounds of alum dissolved in one quart of boiling water. Add these solutions, while still warm, together, stirring in the meantime. The alum water should be added last, and slowly. When all is smooth add enough cold water to make it of the consistency of heavy varnish. Apply the size with a large wall brush, and, if it does not work free enough, warm it some. Follow this with two coats of paint, as described above for the first method.

—718—

To Keep Distemper Color from Separating.

Go over the ground with a sponge wrung out of old or stale ale in summer time; in winter moisten the sponge with cheap whisky. As a second precaution, add to each pint of your water color one tablespoonful of prepared ox gall. This you can obtain from any large supply house in your town dealing in artists' and decorators' supplies.

—719—

Killing Acid or Alkali Spots in Plastered Walls.

What will kill acid or alkali spots in the plastered wall of a brick building? The plaster has been applied directly on the brick wall and it is to be painted with flat oil paint. Have used several things to stop the spot from coming through the size and paint that has already been applied, but failed. They are not water spots, but must be either acid or alkaline.

We do not believe in your theory of the spots being caused by acid, but are pretty certain that they are caused by the alkaline property in the plaster. There may be an excess of moisture in the bricks, and this penetrating into the plaster dissolves the alkaline salts therein, which exude or bloom out and eat through any size or paint in spots.

The only remedy we can suggest is that you scrape the walls clean down to the plaster and cut out the bad spots down to the bricks, and fill up with calcined plaster (plaster of paris), pressing it well with the spatula, leaving it slightly below the surface of the wall. When the plaster has well set, skim it over with hard white putty, made from white lead, rubbing varnish and turps. When this skim coat has become hard, go over it with sandpaper, so as to make it even with the surface. After this give a priming of white lead in oil, thinned with raw linseed oil, three parts, and turps, one part, adding a little drier. Do not have this too stout and when dry, give a coat of glue size and then another coat of oil paint, finishing up with the flat paint.

Spots of a brown color on walls plastered directly on the brickwork are sometimes due to dirty or sooty bricks—either old bricks from chimneys or brick that have been directly exposed to the fire while being baked in the kiln. The only satisfactory way to cure spots due to this cause is to cut out the dirty bricks and replace them with clean ones. The writer has seen a soot from a sooty brick come through a four-inch marble slab and permanently discolor it.

—720—

Painting Sandfinished Walls and Ceiling in Office.

To paint the walls and ceiling in a sandfinished room in a business house, to be finished in full gloss, both ceiling and walls, it was suggested that water color be used on the ceiling and that walls be done in gloss.

Your suggestion to use distemper on the ceiling and gloss paint on the walls does not appear to be out of the way for smoothed finished walls and ceiling, but our experience has been that in office buildings, where walls and ceilings are painted, both walls and ceiling are done either in distemper or in oil paint, either flat, eggshell gloss or full gloss for walls with eggshell gloss or flat ceilings. On sandfinished ceilings even oil paint will not show up with high gloss.

—721—

Flat Glaze for Walls in Oil Fresco.

We are not quite clear as to whether reference is made to the so-called flatting varnishes that give the effect of a rubbed surface without the trouble of rubbing or mossaing down the wall, or whether a liquid is desired which, when mixed with your white pigment or colors, will produce a dead flat effect without the application of a varnish. If the former, we have no data at hand which would give you the desired article, and, at any rate, it could not be produced by simply blending in a cold way of the necessary ingredients, and you would hardly care to install the plant required. Those varnish manufacturers that have a satisfactory flatting varnish on the market have no doubt spent large sums of money until they had the article perfected, and we know that many thousands, not to say hundreds of thousands, of dollars, were spent without returns by the varnish trade on this product. This fact and the present high cost of the ingredients are reasons for

what you believe to be unreasonable. If, on the other hand, you desire a liquid for producing a flat wall finish, we should suggest that in thinning your white base or tints you use one of the turpentine substitutes now offering in place of ordinary benzine, or any mixture of benzine and turpentine. The paint will flow smoother and dry more to a dead flat effect, because the substitutes you will find offered in our advertising columns do not evaporate as rapidly, therefore, the paint flows more freely from the brush and can be laid off more uniformly.

—722—

Durable Paint for Kitchen Walls and Ceiling.

No matter how little cooking is done in a kitchen and how good the ventilation may be, the steam arising will carry with it some grease, and flat paint is a good dust and dirt collector. Size walls and ceiling, if new or unpainted, with a good wall or suction varnish, thus apply two coats of paint of the desired tint or shade, the last coat to dry with not more than eggshell gloss, to be finished with a good, hard-drying interior varnish. In this way you have a coating that will not be affected by moisture and will be washable with soapsuds and ammonia water. If the varnish loses its luster from repeated scrubblings the paint will remain intact and a new coat of varnish will make the walls and ceiling like new.

—723—

Prepared Flat Interior Wall Finishes.

Information wanted about the prepared flat wall finishes that are now so extensively used on the interior walls of new buildings in place of kalsomine.

The flat finishes referred to are a comparatively recent product. As a rule they contain lithopone white, a chemical product combining zinc sulphide and barium sulphate as their principal ingredients, with more or less carbonate of lime (whiting) or clay, etc., in addition. This combination of pigments is ground in specially treated oil or varnish, and thinned with petroleum products of a less volatile nature than turpentine or ordinary benzine. The varnish or oil used in grinding must be of such preparation as to give the necessary binder and elasticity to the paint and must not contain any lead or copper salts that might tend to discolor the white pigment on the drying of the paint. Upon these properties depends the value and wearing of the paint.

Answering the questions in your letter as to covering, we may say from observations that when well made these finishes cover as well as white lead paint, and from what we know of the pigment it is not any more brittle than white lead, and should the paint scale or flake or chalk in time, so as to make an inferior foundation for repainting, the cause, in our opinion, would not be due so much to brittleness of the pigment as to inelasticity in the liquid portion.

As to the feature of economy or saving in cost, as compared with white lead paints, the growing consumption of the prepared flat white should be sufficient answer.

—724—

Coating Walls for Rooms Containing Nitric Acid Vapors.

How the walls and eventually some of the apparatus may be protected by paint against nitric acid vapors and nitrous gases.

There is no effective remedy or any paint coating that will wear for a long time under the conditions named. The best inexpensive coating, so far known, is one consisting of water glass, barytes and asbestos. Twenty parts silicate of soda (water glass), ten parts barytes and ten parts powdered asbestos are mixed to consistency of batter and applied with a suitable brush, but before this is done the surface should be or, in fact, must be, coated with a thin coat of lime whitewash. To make the water glass coating more durable and protective, a

coating of warm coal tar is applied over it. Still better is a coating prepared as follows:—Equal parts of caoutchoue, well dried, and common rosin are melted together. While still in the kettle and liquid, zinc oxide, lithopone or dry yellow ochre or red oxide is added to make a paste, which is thinned to brushing consistency with a varnish, made from fifty parts by weight of rosin, forty parts denatured alcohol and four parts benzol or benzine.

—725—

Flat Paint for Smooth Plastered Walls.

To make a flat wall paint for smooth plaster.

Unless you have a paint mill in your shop you will have to purchase the base of your paint ground in oil in paste form. The base of the flat wall paint for interior work now on the market is lithopone white or zinc white and lithopone in certain proportions, with probably small quantities of inert pigments, ground in a specially prepared oil or varnish, so that when thinned to brushing consistency with turpentine and petroleum spirits the paint will dry on plastered walls a dead flat. These paints are mostly offered in clear white, but of late also in tints and colors. It will hardly pay you to manufacture these goods yourself, as you cannot purchase the raw material at as low a price as the manufacturer who buys in great quantities. Of course, you can make your flat wall paint in the old-fashioned way by thinning down lead in oil or zinc in oil, or a mixture of these with turpentine or benzine, but it will cost you more, gallon for gallon, for the material than the paint purchased from the manufacturer.

—726—

Tiffany Finish on Plastered Walls.

The Tiffany Studios, New York city, are specialists in the art of painted glass in church windows, and the blended colors which cast their reflexes on the inner walls when the sun throws its rays against the windows produce many beautiful effects on these walls, according to the variation of colors. The Tiffany firm has taken advantage of this, imitating the effects, hence the name, whether it is had in wall paper or in paint. A great deal depends on the skill of the decorator, as will be seen presently. For instance, the walls of a large room, parlor, library or hall are to be done in Tiffany finish and the ground tone is to be pale green, the wall should be coated solid in buff made from white and medium chrome yellow, no ochre to be used. If the work is to be first class, as in a parlor or reception hall, a thin coat of white shellac varnish is applied over the buff ground. Now we reach the foundation of all—the ground tone. Some fancy greenish, others brownish, others bluish, but the ground color in all cases should remain buff, as stated above.

The surface is now glazed all over with either green, brown or blue, which must be transparent, and no matter what color is selected it must be "matte." At the same time, several, say three pots, must be held in readiness, with say red, blue, green or whatever variations in effect are desired, but each must be a glazing color, transparent, and one brush in each pot. It now depends on the skill and genius of the decorator to work in the various colors over the glazing color. It is self-evident that these colors must be stippled, as they cannot well be blended. In this wise the effect will be partly flat, partly glossy, therefore when all have thoroughly dried a flat or matt lacquer or varnish of pale color and good translucency must be applied as a finish.

—727—

Painting Walls of Alpine and Lime Plaster on the Pacific Coast.

If we are properly informed, the paints that have best stood the climate of your locality were ready mixed liquid paints composed of nearly equal portions

of white lead and zinc white, with not over 15 per cent. of such inert pigments as silex, china clay and magnesium silicate, either singly or in admixture for the pigment and linseed oil, with small portions of liquid drier and turpentine and probably a trifle of benzine as the medium or vehicle. Any surface containing caustic lime or other material of alkaline characteristics may be disastrous to the life of linseed oil, as it tends to saponify the oil, causing the paint to run and wash down under adverse weather conditions. This is the case especially in comparatively new surfaces, before the atmosphere has had an opportunity to turn the caustic lime into the harmless carbonate. We are inclined to say that even if it were possible to make linseed oil paint sink in deeply it would be of no avail if the walls are not at least one year old. We should advise preparing paint for the first or priming coat by thinning a paste paint ground in linseed oil with one of those mineral oil substitutes for turpentine, adding liquid drier, permitting this to become dry and hard. If this has been absorbed by the plaster so much that no trace is visible, then apply a second coat of the same, and when this has dried hard follow with a finishing coat of linseed oil paint that contains only enough spirits of turpentine to spread well and enough drier to harden. This finishing coat will be the weather resisting and protective, as well as the ornamental portion of the work, while the under coat or coats will have acted the lime resisting, binding and sealing part.

—728—

Paper Coming Off Wall Sized with Gloss Oil.

It is absolutely necessary to remove all of the varnish or other preparation from walls before applying any kind of size, especially when hanging fine wall papers. It is not fair to expect a size, no matter how good it is, to overcome the difficulties resulting from attempting to apply paper on walls covered with cheap preparations. No size of any kind is good enough to overcome the tendency of the varnish or cheap gloss oil to peel after paste and paper is applied to it. There are several ways of removing the varnish, and it is impossible to specify any given method which will answer for all cases. Sometimes a wall has been treated to various coats of varnish, shellac or paint, different painters having different ideas of the right preparation to apply to walls before kalsomining. Some pin their faith to gloss oil or cheap varnish, some to shellac, and still others swear by flat paint, and it so happens that at various times a ceiling will have had the misfortune of having received a coat of each, due to the fact that different painters have come along in turn and applied the preparation that each was wedded to, regardless of the fact that perhaps there was enough preparation already on. When it comes to a condition of this kind, and it often does, there is nothing else to do but use a solution of lime and soda.

If the ceiling has had only one coat of cheap gloss oil or varnish it is quite a simple matter in most cases to remove it. Make up a fresh batch of paper-hangers' flour paste, and while it is hot, add to it about a quart of alcohol to a pail of heavy paste. Apply this paste to the varnish surface quite freely with a kalsomine brush. Sometimes it will be possible to scrape off the paste while it is still wet and bring the varnish with it. Whether or not this can be done can be found out by trying to scrape it off after having done a stretch or two; otherwise it will be necessary to let it stand for twenty-four hours or more. At the end of this time it will be found that the paste has dried, and in drying it has curled up, and upon closer examination it will be found that varnish has come off with the paste. This method has been found to be very effective, especially where only one coat of gloss oil has been used. If, however, this is found to be unsuccessful, it may be possible to clean the varnish off by applying a solution composed of a gallon of hot water and a pound of washing soda. Apply to the entire surface and let it dry, after which rub well with No. 2 sandpaper. This rubbing ought to bring the varnish off in a powder. If neither of these methods are successful, it will be necessary to use the lime and soda above referred to. The lump lime is slaked with cold water in the usual manner, and after being

well slaked without burning and while it is still hot, add to it a solution of washing soda dissolved in hot water (a pound to a gallon). Apply this in paste form and allow it to stand for a short time, after which it can be scraped off with a putty knife or broad knife. Care must be taken in handling this mixture as it is injurious alike to hands, brushes, woodwork or anything else with which it may come in contact, and is only recommended here because it removes paint or varnish from wood, iron, stone or plaster when nothing else will.

—729—

Keeping Grease Spots Back in a Wall.

We do not know of any other way to overcome this trouble but through the application of a coat of shellac varnish because glue size would answer no better than an oil varnish size did. There must be something of an entirely different nature and this you have in a spirit varnish which shellac really is. Then it may become necessary to apply a coat of white lead in oil, flat, in order to make your water color hold on the shellac. This is rather expensive.

—730—

Mott Work on Walls.

Mix 25 pounds pure white lead ground in oil with 10 pounds bolted whiting and 5 pounds plaster of paris, one-half gallon boiled oil, running all through a hand mill, then add one pint strong drier and enough turps to enable you to apply it to the wall, to which it must adhere without sagging. When it begins to set, or rather a little before, go over it with a plasterer's smoothing board, pressing it against the paint and immediately lifting it off, giving the wall a roughened appearance all over. If the wall has not been painted before it must be given a coat of oil paint that will dry with an eggshell gloss, or almost flat before the "mott" work is applied. When dry the wall may be decorated in any suitable color.

A less expensive paint of the same character is made by grinding in a mill the following:—Ten pounds dry white lead, 10 pounds bolted whiting, 15 pounds plaster of paris, 10 pounds yellow ocher, mixed with one-half gallon raw linseed oil, one and one-half gallon brown japan and one-half gallon turpentine substitute or benzine. Use in the same way as the first formula.

—731—

To Keep Wet Spots from Striking Through Plaster.

There are a number of "damp proof" compounds upon the market, but we are at a loss what to advise because of a lack of explicit information as to the conditions. If the dampness is due to the fact that the cement has not been painted and is porous to the extent that this absorbing rain water and causing it to soak through the walls into the plaster on the interior you must first endeavor if possible to prevent the water from striking the cement and if this is impossible so treat the cement that it will shed the water. This can be done, as we have said, by treating the surface with some of the compounds frequently advertised, or you can render paraffine wax liquid by melting over the fire and apply to the wall (cement side) while hot. Several coats of this application will make the walls resist the dampness, and we think will enable you to do the work without the spots showing through. If you cannot go to all this trouble and desire to use an article which can be applied right over the damp spots on the plaster surface we would suggest that you try "Duresco," which we have found very efficient in that it is really a washable water paint and will dry over wet spots without showing any discoloration.

R. N. Hunter.

—732—

Wall Size of Water Glass and of Soap, Glue and Alum.

Sodium silicate, more popularly known as silicate of soda, or water glass, is perfectly safe to use on new plastered walls as a size, because it forms in contact with caustic lime an insoluble silicate of lime which is inactive because insoluble. The silicate of soda of commerce, when to be used for this purpose, is best diluted with double the quantity of water and applied with a fiber brush. When the plaster is very smooth and of hard finish, the water glass may be still further diluted with water and yet stop the suction in the wall. It will serve as a sizing for either oil paint or water paint.

Whether there is any chemical action or reaction, strictly speaking, when soap, glue and alum are mixed together we are not prepared to say, but it is a matter of fact that a mixture of soap and glue alone will not harden sufficiently to be painted over. The addition of alum hardens the soap to a certain extent and renders the glue insoluble on exposure to the air. When glue size without soap is used the addition of alum keeps it from souring or molding, and when a size of soap without glue is used under water paint it is liable to rub up on the application of the paint unless alum has been added to the soap solution. The addition of alum to size also permits water paints to flow more freely and evenly over it.

—733—

Testing Colors for Resistance to Lime.

Painter, Columbus, Ohio, would like to know of a simple test to determine if certain colors are limeproof.

For dry colors the best method is to prepare a 10 per cent. solution of caustic soda and have it on hand in your shop in a corked bottle. Dissolve one part by weight of caustic soda in nine parts by weight of water; fill a test tube half full with the solution, heat it over a gas flame or the flame of an alcohol lamp to the boiling point, stirring in with a glass rod a little of the color to be tested, and if after a short time there is no appreciable change in the tone of the color it may be considered limeproof. The test can be made also with milk of lime in a porcelain dish in a similar manner, but requires more time for observation.

—734—

Treatment for Damp Walls.

If the dampness comes through the wall from the outside the cure must be applied on the exterior of the wall. In that case the wall should receive two coats of a good oil paint after a spell of dry weather. If the dampness, however, does not come from the outside, you can make a damp-proofing liquid by placing in a suitable vessel ten pounds of air slaked lime, two pounds glucose (grape sugar), one-half pound powdered alum, one-half gallon boiled linseed oil and one pint oil of eucalyptus, adding two gallons hot water gradually, while stirring, until all is dissolved. If this liquid on cooling is too stout to work freely under the brush, add more warm water. You can mix with this liquid any lime-proof pigment, such as zinc or lithopone, Venetian red, ocher, umber or lime blue, using the mixture in place of paint. Never use shellac varnish on damp walls, but you might try in place of the liquid referred to plaster of paris wet up with weak glue size and alum solution.

—735—

Rough Work on Interior Walls.

This, at one time, was termed "mud work," and the material was mixed very stout from one-third to one-half by weight of keg lead, balance being made up with equal parts by weight of whiting and plaster of paris, thinned sufficiently

with equal parts boiled oil and turpentine to be just barely workable with a stubby brush. Enough drier was added to keep it from sagging when on the wall and dry color used for tinting. While still wet it is gone over with a plasterer's smoothing or troweling board, that has been moistened with water. This is pressed lightly against the wall, then raised, so as to raise some of the paint in the shape of small pebbles, in other words, it is really enlarged stippling. When dry, the surface may be painted over with any desired color or tint. If done properly, it is very durable.

—736—

Repairing a Plaster Statuette.

Formula desired for mixing calcined plaster (plaster of paris) for repairing a large statue of a dog that is minus one leg. Has tried plaster of paris with lime, but when it becomes hard it cracks all over.

Answer:—You cannot expect figures of a calcined plaster and lime to stand without cracking and we would advise you to use freshly calcined plaster, nine parts by weight and one part by weight of powdered marshmallow root, mixing the two ingredients together in enough water to make a medium paste, out of which to form the missing leg. The marshmallow root imparts toughness to the plaster and prevents it from setting too quickly, this being the reason for the appearance of cracks.

—737—

Painting a Damp Plastered Wall Adjoining Vault.

We have a formula for a damp-resisting paint from an experienced master painter as follows:—Prepare a mixture, in a small barrel or tub, of fifty pounds air slaked lime, ten pounds glucose, two and one-half pounds alum (powdered), fifteen pounds boiled linseed oil, five pounds oil of eucalyptus and 68 pounds warm water, adding these ingredients gradually in this rotation, stirring until all is dissolved. If the material is too stout to work freely under the brush, add more warm water. With this, coat both sides of the wall, and when one coat has become dry, apply another, and if needed, a third one. You can add to this liquid any lime proof pigment, such as zinc white or lithopone, Venetian red or yellow ocher, four pounds of any one of these being sufficient to one gallon of the liquid mixture.

If this does not stop dampness, the only remedy will be to remove the plaster, coat the brickwork with paraffine varnish and then plaster over this.

—738—

Flat Wall Finish to Apply Without Laps.

Trouble with flat wall finish setting up too fast, causing laps on large surfaces.

If flat wall finish sets up too rapidly it simply means that it lacks free working or flowing property, which can be given it by adding bleached or refined linseed oil, in moderate quantity, just enough to make the paint work more freely under the brush without, however, making the finish gloss up and thus produce flashes or streaks. However, it is best to select a brand which has the proper flowing and free working property as that will not require to doctor the paint and will give time to put on large stretches without laps. It is best not to coat too large a surface at a time and to let the edges stand until they dry before proceeding. A little too much oil will make matters worse. Some painters prefer rapid setting, while others do not, even if the finish does show a little "sheen." A dead flat wall finish cannot be had unless the work is prosecuted with rapid movements and not allowed to stand until the paint sets up.

—739—

Weatherproofing an Exposed Plastered Wall with Paint.

A party wall of brick between two adjoining four-story houses was left standing above the third floor of the next house, which was torn down, but only rebuilt to that height. To cover the bricks above the roof of this house they were coated with cement plaster, and the owner, being afraid of moisture penetrating to the interior, desired the wall coated to prevent this.

We presume that this is a rough plastered job, and if so, would say to get on priming coat during a spell of dry weather one will not experience any trouble unless the plaster contains a large portion of lime addition to the cement. In this case unless the action of the lime on the oil in the paint is neutralized it would hardly be safe to paint the wall inside of six months, give the plaster at least two applications of a wash, made by dissolving equal portions by weight of zinc sulphate and water, and oil paint is then not liable to be thrown off in a short time. If a painter does not care to make use of a prepared concrete paint, as advertised by manufacturers, then he can apply a priming of pure lead in oil, with the addition of some turpentine, well rubbed in, and follow with two coats of lead and oil paint known to be water resisting from experience. Do not use boiled oil in such paint, but a small portion of bodied or blown oil and permit every coat to dry thoroughly.

—740—

Finishing Walls in Hospitals to Stand Washing.

We would suggest to apply a coat of varnish wall size next to the plaster, this size to consist of a hard drying interior varnish, thinned with 62 deg. benzine at the rate of two parts varnish to one part benzine by volume. This size must be entirely free from tackiness before painting is proceeded with or subsequent coats are liable to crack, alligator or peel off.

Follow with a coat of inside flat wall coating, such as can be obtained from any paint supply house, and see that this also dried thoroughly and hard before applying a final coat of finish. For this you can use any good interior gloss finish or interior enamel that you obtain from a supply house. We would suggest that you look through our advertising pages for a selection of these goods. To have this finish so free from porosity that it is readily cleansed from time to time by washing with mild solutions of soap and water, the finish must contain at least a portion of good, hard gum varnish. A finish made from white lead is not desirable for hospital rooms; it should be made with zinc white as a base. You may find it advisable to apply two coats to the finish, in which case the coat next succeeding the flat coat should be cut some with turpentine to produce an eggshell gloss.

—741—

Killing Lime in Plaster.

Dissolve 25 pounds zinc sulphate in five gallons warm water and strain through a medium fine wire sieve. Set aside in a clean container and, when required for use, dilute with hot or cold water, whichever is most handy, to brushing consistency. Wash over the patches of new lime plaster two or three times, allowing each coating to dry before applying the next. You can paint or paper or kalsomine over this without risk of the lime eating through and the surface will remain dry.

—742—

Mixing Paint for Combed Effect on Walls.

Mix your paint from lead in oil, preferably, even somewhat stouter than for stippling with plenty of drier, and for economy's sake, you can use about 25 per cent. whiting, along with the lead, which will aid the paint from keeping the combing apart. Apply paint or varnish after combed surface has hardened.

—743—

Damp Proof Liquids or Coatings for Walls.

Information required to stop dampness on the inside walls of basements made of stone, that have been rough plastered and whitewashed, which coatings are coming off every spring and summer when basements are not heated and show considerable mold.

We know of a liquid composition that will dry hard as stone when directions are followed in first scraping off all the loose plaster and pointing the wall with mortar in order to fill up large holes, etc. The best mortar for the purpose is made from fresh cement, one part by measure, and two or three parts dry sand, to which enough slaked lime may be added to whiten it somewhat. This must be permitted to set and dry well. The composition consists of 140 pounds powdered pumice stone, 5 pounds good glue, 10 pounds pine oil, 30 pounds boiled linseed oil, 10 pounds varnish bottoms.

It is prepared as follows:—Melt the glue, after soaking in cold water, over night, in about one gallon of water. Mix the pumice stone in about $3\frac{1}{2}$ gallons of cold water to a stiff paste. Have the oils, and mix well; then run the mass through a mill, into a barrel or tub, holding 50 gallons. Stir into this, thoroughly, 30 gallons hot water and let it settle for 24 hours, then the liquid is ready for use. Syphon all the clear liquid off from the pumice that has settled to the bottom.

The sediment may be used again and again for half a dozen times by adding the same quantities of glue, oils and varnish bottoms, treated as before. It may be also used on brick work. Apply with brush or spraying device.

It must be noted, however, that on walls that are up against damp ground on the outside, the treatment rarely succeeds, unless the wall is puddled or coated with a layer of concrete to keep out the moisture.

—744—

Preventing Inside Flat Wall Paint Setting Too Quickly.

A. C. K., Pennsylvania, desires to know, what can be added to inside flat wall paint to prevent laps.

Answer:—A very small portion of bleached linseed oil, not over a gill to the gallon, well incorporated.

FLOOR FINISHING.

—745—

Filling the Open Joints in a Floor That Is to Be Stained.

If the joints are wide it is best to use a mixture of whiting and glazier's putty, to which some blotting paper that has been soaked in water is added, and this mass should be well kneaded together with some brown japan and a little turpentine; then well prassed into the joints with the putty knife. If the joints are narrow, not over one-eighth of an inch in width, ordinary glazier's putty to which sufficient whiting and japan has been added to make it dry fairly quick will serve the purpose. It is best, however, to first give the joints a coating with boiled oil to give the putty a good hold and the putty should be colored to match the stain, as otherwise the filling might show up too prominently. To make a quick and hard drying putty use equal parts dry white lead and whiting, and mix with equal parts of coach japan, rubbing varnish and turpentine to a stiff paste. This putty will dry hard over night, unless the joints are very open, but will have to be colored to match the stain before it is used.

—746—

Fillers for Cracks in Floors.

For cracks less than one-quarter inch in width it is recommended to take pure linseed oil and whiting putty and knead it into a stiff mass with some dry white lead, tinting the mass with a little dry color to match the floor and pressing it firmly into the cracks, which should first be penciled with boiled oil. After pressing in the putty with the putty knife, smooth it over by wetting the knife with turpentine. When the putty has become hard, any surplus on the surface may be leveled down with sandpaper. For large, wide cracks, an unshrinkable filler or putty may be prepared from glue size, whiting and fine sawdust, well mixed to a stiff paste, to which enough dry color is added to match the color of the floor, which, after cleaning out the cracks thoroughly and oiling the sides as above, is pressed into the cracks firmly and smoothed over with the spatula or putty knife. Better still is a lot of blotting or lining paper (in fact, any paper made from wood pulp will do) that has been soaked in water and is then squeezed to remove the surplus water, mixed with whiting and glue size and kneaded into a fairly stiff mass, stained with dry color to match the floor and pressed firmly into the cracks, allowed to harden and finally sandpapered to remove the surplus.

—747—

Best Treatment for Georgia Pine Floors.

The best treatment was asked for Georgia pine floors that are put to very hard usage in a public institution; both to best preserve them and have a clean finish on them.

We do not know of any better way to treat a Georgia pine floor than to wax it. The new floor should have a coat of floor wax as a means of filling or leveling, and when this has become hard another coat as a finish. Waxed floors are easily renovated and do not darken like oiled floors, nor do they show the wear so badly as varnished floors.

Oiling floors constantly with floor oils (non-drying mineral oils) is apt to ruin dresses, and the practice is not so much in vogue as it was ten years ago.

A treatment recommended by an experienced hardwood finisher is to give the floors a coat of silex paste filler, which must be well rubbed into the wood until the soft parts are as hard as the hardest parts. This is done by applying the filler to a strip six or eight boards wide and running the full length of the room. As soon as it sets, but before it has become hard, rub well with burlaps across

the grain of the wood. Any surplus filler should be wiped off with a soft rag. Let the filler dry for 24 to 48 hours and give two thin coats of white shellac (or orange shellac, if the yellow tone is not objectionable). Then the floor should be oiled with paraffin oil or a rubbing and polishing oil, wiping off any surplus oil that may remain on the surface to get it as dry as possible. Repeat this oiling every week or two, according to the wear received.

—748—

Floors That Get Hard Wear.

What is the best way to finish maple floors for kitchens, stores and flats that get hard wear?

That's a pretty difficult question to answer satisfactorily. There are two places about a house where the floors are specially difficult to treat: one is the kitchen and the other is the front piazza, because each gets a great deal of hard wear and a good deal of dampness. Anything that will stand on either of those places would answer the requirements of the other two that have not been mentioned. No matter what kind of oil might be used to oil the floor, whether linseed or mineral oil, it would surely turn black after a while, if we oil it on the bare wood, and it don't make any difference what kind of oil you use. There is one thing that is usually necessary for a floor finish, and that is that it must dry quick and be hard enough to stand wear. There are two kinds of finish open to us—wax or shellac.

A wax finish usually requires more attention than a kitchen or store floor would be apt to get, and is better suited to apartments where there is less hard wear. It is soft, and although it does not scratch, dirt is apt to be ground into it, so it is best to confine the use of wax to rooms that are at least partially protected by rugs. And a wax floor is apt to become slippery.

Well, my experience with floor varnishes is that the best of them in time will scratch and mar white after the linseed oil in them begins to oxidize. Of course, some floor varnishes last a good deal longer than others, and a varnish can be kept in good condition for a longer time by feeding it with a varnish reviver or a floor oil, but my suggestion would be to first fill the floor and then give it a coat of shellac. This should be kept in order by occasionally rubbing it with floor oil or furniture polish, say once every week or two. This is something that is as easy to do as wiping up a floor with a damp rag; the only thing that is necessary is to avoid getting too much oil on the floor, or it will collect dust. The filler and the shellac prevent the oil from getting into the wood and darkening it. Now that denatured alcohol has reduced the price of shellac varnish I think that shellac will come into much more general use than it has formerly had.

The Veteran Painter.

—749—

Finishing Hardwood Floors in the Natural.

What is best method for finishing floors of hardwood, such as oak, maple, etc., in the natural so that the wood will not darken? Is there any way of bleaching hardwood floors that have been treated with linseed oil and become very dark with age?

Oak floors require a filler, if good smooth finish is desired in the natural, no matter what material is used. Maple does not require filling. For oak floors a good mineral paste filler and two light coats of grain alcohol shellac varnish, or in place of the latter, waxing frequently with a good floor wax will keep the floor from darkening. Ordinary floor varnishes or linseed oil will produce darkening. Mineral oils tend less to darkening of wood than linseed oil, but are not to be thought of for use in dwelling houses or public halls on floors, because of the tendency to soil the ladies' dresses. For maple floors three coats of grain alcohol white shellac varnish or repeated treatment with floor wax will not darken the wood. As to your question about the bleaching of floors that

have been oiled and become dark, the only remedy we know of is to remove the oil with a paint and varnish remover and then treat the wood with a strong concentrated solution of oxalic acid or by the use of bleaching powder. The use of the last named, however, is liable to be injurious to the health of the operator, and we would not recommend its use. The oxalic acid solution, while poisonous, is harmless when used with care.

—750—

Oil or Varnish for Hardwood Kitchen Floor.

Which oil or varnish is best and most durable for use on the hardwood floor of a kitchen?

The best oil for new floors or polished floors is made by mixing 4 pints of pure raw linseed oil, 1 pint turpentine and $\frac{1}{2}$ pint orange shellac varnish. Mix the turps with the shellac first and then thoroughly stir in the oil. If the floor is new, rub this oil in thoroughly and give as many coats as required to fill the wood, allowing each coat to dry hard before applying another. If used as a polish for floors that have been oiled or varnished apply the oil with a large brush and then use a weighted floor brush with long handle to produce the finish. Oil for hardwood kitchen floor is preferable to varnish, though it tends to darken the wood, because it will outwear by far the best varnish. Varnish for floors must be of hard gum and low price must not be considered if wear is to be expected.

—751—

Finishing Hotel Floors.

A man had the floors in a new hotel to finish—about 4,000 square feet of Georgia pine—in the office, reading room, barroom, halls, parlor and dining room. The trim in these rooms is chestnut, with the filler darkened somewhat, then the wood is varnished and rubbed to a dull gloss. The architect leaves the method of finishing the floors to the painter, stipulating that he did not want much gloss when finished. He wants to give a good job, but does not want to put more work than necessary on them.

No varnish that he could put on those floors will last. It may look all right for a time, but as soon as the linseed oil in the varnish has oxidized it will scratch. And those floors are going to get hard usage. My idea would be to give the floors a coat of shellac, and then give them a coat of wax. Of course, that means that they must be looked after frequently; must be kept in condition by polishing them now and then with a weighted brush, and occasionally giving them a little more wax. When the floor gets dirty and shabby, the wax should be cleaned off with turpentine down to the shellac, and the floors should be waxed over again. But all the polishing and occasional waxing can be done by the hotel servants. When the wax is cleaned off for refinishing, any places that have been worn through to the wood should be touched up with shellac in order to give an even surface before rewaxing. A well-known hardwood finisher who has had some experience in finishing the floors of the large New York stores first fills the wood with a silex paste filler, which, he says, can be rubbed into the soft part of the grain until it is as hard as the hardest part, preventing the boards from wearing away irregularly. His method is to apply the filler to a strip of six or eight boards wide running the entire length of the room. By the time you have got to the end of the room the filler will probably have set enough to rub—it must not be rubbed before it sets. Then you rub it well into the grain of the wood with burlaps, taking care to rub always across the grain. Any surplus filler is wiped off with a soft rag. You don't want to use burlaps for wiping this off for fear of rubbing the filler out of the grain. Then you must let the filler dry for at least twenty-four hours—two days would be better—and follow this with two thin coats of white shellac, or, if the yellow tone is not objectionable, orange or brown shellac may be used to advantage, since it is stronger. This makes the foundation. The floor should then be oiled with

paraffine oil, taking care to apply a very thin coat with a brush or rag, and wiping off thoroughly any surplus oil that may remain on the surface so as to get it as dry as possible. A floor thus treated should be oiled and polished with a dry cloth about once a week, but this is something that a servant can do just as readily as wiping it up with a damp cloth. The so-called dustless floor oils that were much used a few years ago met with disfavor because they gathered up the dirt and soiled the ladies' skirt, but the reason was because they were used on the bare wood, and consequently a good deal more oil was used than should have been, making the surface greasy. In the treatment advocated, the shellac prevents the absorption of the oil, leaving just the merest film on the surface to save the shellac from wear. Shellac is necessary, and such treatment cannot as well be used on a varnished floor, nor on one that has been first coated with a liquid filler, but it is not necessary to use a grain alcohol shellac. One of the rubbing and polishing oils that so many of the manufacturers are making may be used. The kind that are recommended for use on floors or for polishing furniture. Such a finish will not scratch and can always be kept in good condition.

The Veteran Painter.

—752—

Treatment of Hard Maple Floors to Stand Hard Wear.

What is the best method of treating a hard maple floor that is subject to constant wear in the dining hall of a large hotel? Wax is objected to on account of being slippery, and oiling the floor will darken the wood in time.

The best treatment of hard maple floors, when the natural color of the wood is to be well preserved, is to apply not less than two coats of bleached shellac varnish to the prepared floor, but for good work three coats are recommended. The white or bleached shellac varnish for this purpose should be the article known to the trade as grain alcohol shellac, which is bleached gum shellac cut with denatured alcohol, and far superior in every respect to the article made with wood alcohol. As wax is objected to, the shellac, in order to prolong its life and yet keep the wood light in color, should receive a coat of floor oil composed of 9 parts raw linseed oil and 1 part drier that is well rubbed in, which will produce a dull, smooth finish. As the floor becomes worn, it should be gone over with a floor oil at least once a month, if possible oftener, with a floor oil that is made by mixing, say eight pints of raw linseed oil, two pints turpentine and one pint white or orange shellac varnish. This should be applied with a brush and rubbed in by wrapping a cloth around a weighted floor brush, so that it becomes hard overnight and does not remain sticky. Paraffine oil of pale color and light gravity used in the same manner will also clean and freshen up the floor, and in that way prolong the life of the shellac varnish.

—753—

Best Wearing Finish on Oak Floors.

Would you kindly inform us which you consider the best wearing finish outside of wax on oak floors, shellac or varnish? If varnish is used, is it best to put a thin coat of shellac on first or put the varnish direct on the filler?

Unless three coats of varnish are to be applied to the floor, we would not advise a coat of shellac on the filler, but would suggest a coat of hard drying rubbing varnish directly on the filler, which must be thoroughly hard and sandpapered smooth before the varnish is applied. The rubbing varnish should be mossed down with pumice and water, wiped up clean, allowed to stand twenty-four hours, and the floor finished with some good, hard gum floor varnish. If the price paid for the work will permit it, a coat of white or orange shellac may be applied directly on the filler and sandpapered lightly when dry, then a coat of best rubbing varnish (twelve-hour rubbing) given, which is either mossed or rubbed with pumice and water, and the surface finished with best grade of floor varnish that can be lightly mossed after forty-eight hours, and then polished

with oil and rotten stone. If the varnish is made of the best hard gum and well settled, a floor so prepared will neither appreciably darken nor will it turn white from moisture, nor will it show heel marks or scratches unless used too roughly. But it will not do to be afraid of high prices for materials, and it must be taken for granted that in this, as in other things, the foundation is the most important. Every coat must be dry and hard.

—754—

Finishing an Oak Floor with Varnish.

The question was asked if there is a liquid filler that will serve under varnish on an oak floor; also how paste filler is applied.

On open grained hard woods like oak, paste filler is usually applied, though we have heard of hardwood fillers that were offered in liquid form. Liquid fillers, as a rule, however, are intended for soft, close-grained woods, and as it is difficult for the consumer to draw the line, therefore it is best to use paste filler of good reputation. Directions for use are usually furnished with the goods, and the paste is thinned to the consistency of stout varnish with turpentine only, as the driers are incorporated in the paste. The filler, so thinned, is applied like varnish with a suitable brush, allowed to set, which requires from ten to twenty minutes, then the surface is rubbed across the grain with a bunch of tow or excelsior or fine shavings, which removes the surplus filler from the surface, leaving the grain of the wood filled and the pores sealed, so as to hold up the varnish coats. After rubbing off the surplus filler, it should be permitted to remain untouched for at least twenty-four hours, preferably forty-eight hours, when the floor should be lightly sandpapered and carefully dusted before varnishing.

—755—

Finish for Floor of a Bowling Alley.

A method of treatment was wanted that would give best satisfaction for the floor of a bowling alley.

The most important thing is to tell what kind of wood the floor is composed of. Is it yellow pine, maple or oak? If the wood is open grained like oak, we would suggest that you use paste filler and give two or three coats of the hardest drying floor varnish you can obtain, allowing plenty of time between coats, and rub the last coat with powdered pumice and crude oil. This must not be done for two or three days after the finishing coat has been applied. For yellow pine or maple, filler is not required, but it should have at least two coats of varnish; three if price permits, the last coat to be rubbed or mossed down.

—756—

Essentials for Durable Floor Finish.

Two things are most essential outside of the material, and they are:—First, to see that the floor is absolutely solid; that is, that there is no give to it when trod upon, for in a new floor it will crack the finish, and in an old one it will break and work out of the cracks whatever has been used to fill them. Second, it must be seen that the floor is perfectly smooth, clean and dry.

—757—

Treatment for Bathroom or Kitchen Floors.

A good method to treat bathroom or kitchen floors, consisting of Georgia pine, Oregon fir or other woods of similar nature, so that they will not be affected by water was wanted.

If you refer to new floors, the most effective way and at the same time most economical way to treat them is to oil them with non-drying mineral oil, such as is known to the trade as golden machinery oil. This oil will be absorbed by the wood on first application, but on second application the surplus must be wiped up as much as possible, and the best wipers for this purpose are woolen rags. This oiling may be repeated until the floors take a polish. A mixture of equal parts of neatsfoot oil, cottonseed oil and golden machinery oil is still more effective. To make a good serviceable floor, that will stand water, give a first coat of grain alcohol shellac varnish to the bare wood, and follow with at least two coats of a high-grade floor varnish. If ample time is allowed between coats and the floor varnish worthy of its name, lasting results will be had in the case of bathrooms.

On kitchen floors, however, a coat of shellac, followed by two coats of a first-class floor paint of the desired color, is the best method to be adopted. This floor paint should be made with a hard gum varnish as the principal ingredient.

—758—

To Cure a Floor That Has Been Saturated with Brine.

A floor that has had stored upon it packages of salt meat, salt fish, etc., for years, was to be treated. In damp weather the spots look like grease or oil marks, while in dry weather there appears to be an exudation of salt.

From your description it appears that the floors in question are so thoroughly saturated with grease and brine that there is no known remedy, except to remove that part of the floor and replace it with new flooring. If not objectionable to the occupants, you might try chloride of lime or bleaching powder in moist paste form repeatedly, always washing the spots with vinegar after removing the chloride of lime. A mixture of slaked lime and pearlash or soda ash in the form of thick cream will also serve as a grease eradicator, but the spots must always be washed with vinegar to neutralize the effect of the alkalies.

—759—

To Prepare Floor Wax.

A formula for the preparation of a wax for dancing floors, using paraffine as the base, was wanted.

You can make a cheap floor wax by dissolving ceresine wax or purified ozokerite in kerosene in a water bath or on a hot plate, but you must not use an open fire. Paraffine wax alone will not make a good polish, at least it will not remain well in solution and tends to crumble on application. Another cheap floor wax may be prepared by dissolving one pound of potash in 10 pints of water, heating it to boiling, when 1 pound of yellow beeswax is added in small shreds and all boiled until the wax has melted, then one-quarter pound annatto is added for color. This last wax is used largely for dancing floors in Europe and is applied cold in the usual manner, while the kerosene wax should be warmed in a water bath and so applied.

—760—

To Obtain a Lasting Gloss on Hard Pine Floors.

Waxing will not give a high gloss effect, no matter how often done, but it makes the most durable floor finish and is most easily renewed. A new floor should be well oiled, when of hard pine, and then given two coats of wax floor polish applied with a weighted brush. This makes a good, pleasing finish, that is not readily scratched and wears well. But to obtain a high gloss effect, the new floor should have one good coat of shellac varnish, followed by two coats of high-grade floor varnish, such as is specially made for this class of work and guaranteed by the manufacturer.

—761—

Paint for Porch Floors.

The best composition for porch floor paint to meet the following conditions was wanted:—The porch faces the south, but a portion of it also extends around the west side. The ground is somewhat damp and ventilation underneath rather poor. Have used ready mixed oil paint first, but the paint soon blistered and the owner had the paint scraped off and painted the floor with a well-known floor paint that comes ready for use. This did not blister, but was all off in flakes inside of two months. The floor is yellow pine. Our advice was asked in regard to painting again.

We would advise you to provide proper ventilation, if possible, under the porch floor, because we think the original blistering was due to the dampness under the floor. That the second painting flaked was not unlikely due to inferior varnish in the paint and an insufficiency of oil to bind it. Before applying more paint the floor should be well cleansed and permitted to dry thoroughly. Then a thin coat of pure lead in oil, tinted to nearly match the finish desired, and thinned two parts raw linseed oil to one part turpentine, and a very little drier should be applied and well rubbed into the wood. Allowing this to become hard, two coats of a high-grade exterior floor paint should be given, each coat carefully brushed out, or a first-class ready mixed house paint that is somewhat reduced with turpentine could be used in place of floor paint. If you prefer to mix your own paint we would suggest that you mix white lead and zinc in equal portions, tint to color desired and reduce for application with 6 parts raw linseed oil, 3 parts turpentine and 1 part drying japan. This will do for both second and third coats, but for the latter coat the addition of a small portion of hard drying varnish would be an improvement.

—762—

Hard Drying Durable Floor Paint.

A formula was wanted for a floor paint that will dry very hard and stand wear, such as a kitchen or a schoolroom is subjected to. Is the addition of cement to floor paint of any real advantage?

If we desired to paint a new floor or one that had not been painted before, we would first ascertain what kind of lumber has been used in its construction, whether the wood is hard, like fir or Southern pine, hence not very absorbent, or soft, like white pine or hemlock, and therefore rather porous and absorbent. An old floor, especially when of white pine or hemlock, and well worn, is usually very spongy, and requires a different priming from a new, hard floor, and it should be understood that the priming or first coating of a floor has a very decided bearing on the subsequent wear, because a much used floor needs frequent repaintings, and when the foundation is first-class it saves material and labor on repainting. There is too little patience exhibited on the part of property owners or tenants in regard to this all-important problem, and people, as a rule, are too apt to expect the penny and the cake both. A paint put upon a floor, coat after coat, and each one of them expected to dry hard in from eight to ten hours, so as to permit walking over, cannot be expected to wear any length of time, especially where the housewives and servants are ever ready with soap and water to remove the paint in their desire to have it clean. As a primer or first coating for a new or old hardwood floor, we would recommend pure white lead, thinned with raw linseed oil and a little turpentine japan, not too stout, and well rubbed in. This to stand for from twenty-four to forty-eight hours. The white lead to be inted to near the tint of subsequent coats and the cracks and nail holes filled with good whiting or linseed oil putty, to which a little dry white lead should be added to make it dry hard and non-shrinkable. For soft pine or hemlock floors the priming should be made in a similar manner, but the paint should be a little stouter, and fine yellow ocher may be used in conjunction with the white lead, and the paint be rubbed in most thoroughly. On top of this, after the cracks and nail holes are puttied up and the putty has become hard, two coats of paint, made

from equal parts of pure lead and zinc, tinted with the required colors, and thinned with kettle-boiled linseed oil, turpentine and brown japan, so as to dry with a semi-gloss, each coat brushed out to the utmost and permitted to dry hard, before applying the next, will make the best wearing floor, and there is no danger of its turning white in spots, nor of abrasion, as is the case where inferior varnish has been used in its make-up. Where a buff color is desired the zinc may be omitted and yellow ocher and a little lead only used, while for red a good Venetian red may be employed, but when lead is left out a greater quantity of drier is required. Use the pigment ground in oil only, and 5 parts of boiled linseed oil, 1 part turps and 2 parts good brown japan as a medium for thinning, but, of course, you can vary this to suit conditions.

We do not think cement of any advantage in floor paint, because if it be **fresh** and caustic it will destroy the oil in the paint, and if it be spent, it is only so much dead, coarse material that has no more value than so much pulverized slate; silex or barytes serving the same purpose as well and being inert.

—763—

A Durable Floor Paint.

The following is a formula for a durable paint for floors which will dry hard and wear well, and which is largely used in the old country:—

Mix your color, as usual, to the tint and shade wanted, in pure boiled linseed oil to a stiff batter; then take some old paint skins, which you burn, and when cold gather up the ashes and grind them in turpentine. For driers use sugar of lead and turpentine. For thinners use pure boiled linseed oil. For body, zinc is preferable to lead. The action of the ashes is to harden the paint. When using this kind of paint, use it the same for all the different coats, using more or less turpentine for the under coats. You can varnish over this paint, if desired.

Karl Holm, Van Wert, Ohio.

—764—

Canvas Covered Decks.

When I painted the ferryboats we used to coat the deck boards with a heavy coat of white lead paint, and when it was still wet, we would press the canvas down into it, and then paint it on top. I have seen decks finished that way that lasted for twenty years.

The Veteran Painter.

—765—

Treatment for Cement Floors.

What is the best treatment for a common cement floor in a basement used for a pool hall, so as to keep down the dust and make it easier to clean?

Make a solution of lime by pouring 3 gallons of hot water over 11 pounds of quicklime in a keg or other suitable vessel and cover same with a piece of sackcloth or burlap and let stand over night. Then decant and filter the water through filter paper or several thicknesses of cheesecloth and bottle for future use. Break up 25 pounds of pure white lead in oil, adding 1 pint of oil; add to this, say 10 pounds yellow ocher in oil and 1 pound of lampblack in oil. Beat all these materials until they form a homogeneous mass, then, while stirring constantly, add gradually 10 pounds refined petroleum (kerosene oil) and one-half gallon of the lime solution; let stand a while; then add 1 quart at least of best brown japan and 1 quart of fat linseed oil (or any old linseed oil, not rancid, will do), when you will have three and a half gallons of a coating that is unaffected by the cement and will keep the dust down. When this has been on for a short time, say a few weeks, you can apply any good floor paint, and you need not be afraid of its being eaten away by any causticity that may be in the cement.

—766—

To Make Powdered Wax for Dancing Floor.

To make a floor wax to be sprinkled in powder form on the floor of dancing halls:—

Melt in 63 degrees benzine as much paraffine wax of highest melting point obtainable as will be taken up, then stir into this solution, before cooling, enough French talcum powder as will make a fairly stout paste. Put this powder through a coarse wire sieve and spread it in thin layers on trays, allowing the benzine to evaporate by means of warm air currents. When the material has formed into dry cakes, powder it by the best means at command and put it up in cans with perforated tops and solid slip cover.

—767—

Finish for Hardwood Floor That Will Not Show Scratches.

Good alcohol shellac varnish, when properly applied, will dry so hard that it cannot be scratched readily, and when suitably colored will not show white marks, even when scratched. Here are two formulas for making shellac varnish that admit of free working and easy application. To 5 pounds bleached shellac add 2 pounds Venice turpentine (the clear goods are best) and 16 pounds 95 per cent. alcohol (grain or wool alcohol, or a mixture of the two). Put all in a large glass jar or earthen crock and cork well. Shake occasionally or stir with a clean wooden paddle until all the shellac is dissolved, and the varnish is then ready for application. If desirable, some earth color, like sienna or ocher or umber, may be added to the shellac, but these must be palpably fine and of the strongest staining power, because only very little should be used to prevent the varnish from becoming too opaque.

If a larker varnish is equally suitable, as it should be for oaken floors, especially dark oak, the solution may be made with 4 parts orange shellac, 2 parts Venice turpentine and 18 parts of 95 per cent. alcohol, to which color may also be added. In both cases the Venice turpentine has the function of imparting elasticity to the varnish and to permit its being spread uniformly and its being laid off evenly. Better make a test in the shop first on similar wood, and if too stout to work freely, thin with more alcohol until satisfactory spreading property is attained. For hardwood finish, if a little coloring matter in the varnish is desirable, it should be of the rich, transparent sort, so as not to hide the grain of the wood too much. Two coats will make a very hard, durable finish on a floor, and though somewhat expensive finish for floors, it has many advantages over fat varnishes.

—768—

Methods Employed in Waxing Floors.

It is not necessary to apply floor wax hot, though this is done on parquet floors. Melted wax that has become thick on standing can be thinned with turpentine while cold, but it is best to use a water bath, same as for melting glue. Do not use an open fire, as it is dangerous on account of the fumes.

Work of polishing can be commenced as soon as the wax has set after application. Wax that is left over can be put away for the next job, but should be placed in a well closed package. The wax should have become hard enough so that it will not roll or rub up under the weighted brush. The proper way to proceed in waxing floors is to prepare the wax polish by cutting up beeswax into small pieces and melt it in a water bath, adding sufficient turpentine to make it liquid. To make it of the proper hardness use equal parts of yellow beeswax and Carnauba wax, and thin with turpentine to the consistency of thick cream. Apply to the floor with a varnish brush, and as soon as the mass has set fairly hard to the touch, begin polishing with the weighted brush, and if polish is unsatisfactory give a second coat and polish again.

—769—

Cleaning and Preservation of Oak Parquet Floors.

The cleaning and keeping in condition of oak parquet floors in our dwellings is known to require much trouble and work. The purpose of the cleaning is to keep them as long as possible in that condition in which they were when new. This end is more or less completely attained by the various modes of cleaning. The process still almost universally pursued is mechanical in its action, the cleaning being accomplished by rubbing the dry floor with steel chips. This method, says the "Centralblatt," is a laborious and slow one, hence it seems of advantage to make known more generally a hitherto little employed process, which has quickly crowded out the old method of cleaning wherever used. No dust is generated in this new process. It is founded on the removal of the dirt by oil of turpentine, and is performed as follows:—Dip a perfectly dry wainscot brush in a vessel filled with oil of turpentine and brush a small surface about half a square yard of the floor diligently and repeatedly with it. This treatment is succeeded by an immediate washing off of that surface with hot water, whereupon the cleaned place is wiped off and rubbed dry with a dry rag, or, better still, with oakum. When the floor treated in this manner is perfectly dry, after a few hours it appears as though freshly rubbed down. Now wax as usual, and brush until glossy. The solution of one part of white wax in two parts of oil of turpentine has been found excellent for this purpose. The parquet floors cleaned according to the above method keep like new for a long time, provided that for the frequent rubbing necessary only clean brushes and rags are employed. The cost of the oil of turpentine may seem high, but since the new method requires much less time than the rubbing down with steel chips, the extra cost of the material will be offset by the saving in wages.

—770—

The Drying of French Yellow on Floors.

French yellow is simply yellow or French ocher under another name, and will remain "sticky" or "cleave off" when put on a greasy surface that has been cleaned with soap or lye and has not been rinsed thoroughly. Ocher in oil is not a good thing to paint floors with, unless it be an unpainted floor in very porous condition or on very spongy wood. To apply it over old paint or hard wood, like yellow pine, by itself is a mistake; it should be mixed with its own bulk of white lead, and the mixture should be thinned with a good hard drying japan and turpentine, so as to dry with a good eggshell gloss only. For interior floors it should be mixed with at least its own weight of zinc white, and thinned as noted above. The principal feature, however, is to make the paint as thin as possible and brush it out to the utmost. It will, when so mixed, cover well enough at any rate. A first-class floor paint, though somewhat expensive, but one that wears well, may be made by mixing fine French ocher with wood alcohol shellac varnish, Venice turpentine and fusel oil. Two pounds ocher, seven pints wood alcohol, one-fourth pint Venice turpentine and three-fourths pint fusel oil is the proper proportions.

—771—

The Best Wax for Polishing Hardwood Floors.

The wax that has the highest melting point is best for the purpose, because of its hardness after application. Brazilian or carnauba wax has that property, its melting point being about 185 deg. F., while bleached beeswax melts at 145 deg. F. and paraffine waxes will melt at as low a temperature as 115 deg. F.

Carnauba wax, melted in a suitable kettle and thinned with spirits of turpentine, so that on cooling it has the consistency of soft tallow, is an excellent article for the purpose. The wax should be applied in that consistency to the

floor with a large brush as evenly as possible, permitted to set and then rubbed with a weighted floor brush. When the floor is new two coats are required, one to fill and level up, the second to give luster. If the work is well done heel marks will not show to any extent. Elbow grease is a factor here, as in many other things pertaining to the work of the painter.

—772—

To Remove Wax or Shellac from Floors.

To remove wax from floors use benzine or gasoline and a good scrubbing brush; give the benzine time to soften the wax. To remove the shellac from floors use amylacetate, acetone, wood alcohol and fusel oil, but have plenty of ventilation in the room.

—773—

Floor Varnish That Will Not Mar White.

A floor varnish that will not scratch or mar white can be made from hard gum only and all idea of using rosin, even in part, must be abandoned in the beginning. Fuse 100 pounds kauri gum or 50 pounds each of kauri gum and Congo or Sierra Leone copal; when melted with 25 gallons varnish makers' linseed oil that has been boiled in another kettle with 20 pounds of litharge and 4 pounds manganese oxide, and when thoroughly amalgamated, take kettle from fire to the thinning room and add gradually under constant agitation 15 gallons spirits of turpentine, or if this be too expensive use 5 gallons turpentine and 10 gallons deodorized petroleum naphtha (benzine). This will be, when cooled down, of rather heavy consistency, and, if so, more turpentine or benzine should be added. To be fit for use the varnish must be filtered, or in lieu of that, strained and well settled. For a low-priced interior varnish that may be rubbed 100 pounds Manila gum (nubs) and 50 pounds hardened rosin are melted in one kettle, while in another kettle 12 gallons raw linseed oil are boiled with 15 pounds litharge and one pound manganese borate until the drying mediums are well taken up, when the oil is placed in the kettle with the mixed gum and rosin and the whole fused by keeping it on a low fire until amalgamated, when kettle is taken to thinning room, where 10 gallons spirits of turpentine are added first and then 15 gallons petroleum naphtha (benzine). When this varnish is well made and filtered or aged by settling it will dry hard enough in twenty-four hours to be mossed or rubbed with pumice and water without turning white.

—774—

Treatment of Floors and Finishing of Same. .

For ordinary floors, such as in kitchens or laundries, warehouses, etc., the floor oil treatment is most practiced. This consists in applying to the new floor a non-drying mineral oil, which is prepared for the purpose by heating in a hot water bath one gallon of light paraffine oil to near the boiling point and in the meantime melt in a ladle one-half pound of paraffine wax, adding same to the hot oil, while continually stirring. Stir occasionally while the mixture is cooling to keep the wax from going back into lumps. The oil is applied to the floors with a brush, allowed to soak into the wood and when well set the floor is wiped with a woolen rag wrapped around a floor brush to remove the excess of oil, so as not to soil dresses. The operation should be repeated until the wood is so saturated all over that no flat spots are visible, but a finished surface apparent all over the floor. This finish applies only to soft and hard pine as well as spruce. It is what has been called "dustless" floor finishing, and when the wood is once well saturated it does not need oiling again for from four to six months and is far cheaper than waxing. Oak and hard maple floors also are often simply oiled, but for these woods the floor oil described above is not the proper material.

Take one-half gallon of kettle-boiled linseed oil, one quart of benzine and one quart kerosene oil, mix these and brush over the floor. Do not flow it on, but brush it out and apply a second coat, after all greasiness from the first oiling has disappeared. Three coats should be applied, if time permits. This makes a very durable finish, which, when wiped over with a moistened cloth from time to time, will appear bright and clean. Yellow or hard pine floors may, without any previous treatment, be waxed, and the best method is to use one of the reputable floor waxes now on the market, applying same to the wood as directed and then polishing by the use of the weighted floor brush. When the first coat, which acts as the filler, is hard a second coat should be applied, and also polished in a similar manner. Oak, and all other open grained woods, require hardwood filler before waxing. When the wood has been filled, the surplus filler removed with excelsior or tow, and the filler has dried hard, the floor should be sandpapered and the waxing done as above. The occupants of the house can wax polish such floors from time to time. If it is desired to stain a hardwood floor, the staining is done before filling and the paste filler colored to match the stain. In very fine residences the hardwood floors are filled with paste filler to match the color of the wood as closely as possible, then smooth sandpapered and varnished with one coat of high grade shellac varnish, again sandpapered and finished with at least two coats of very best floor varnish. For extra fine rooms the last coat of varnish is rubbed or mossed, then polished with rottenstone and sweet oil. In touching up old varnished floors it is best to touch up the bare spots with quick drying flat color to match the remainder of floor in color, then give a coat of floor varnish to which color has been added to match the old color of the floor. The color in this case should be ground in japan or varnish and only enough added to stain the floor varnish.

For parquetry floors the best treatment is to apply, in succession, three coats of white shellac varnish, allowing each coat to dry hard, but they can also be waxed without any other treatment.

Floors that are badly worn, no matter what the nature of the wood may be, are best painted with good, hard drying, yet elastic floor paint, which may be all oil and pigment paint and drier or made from oil and pigment with drier and thinned for application with good, hard drying floor varnish.

—775—

How to Treat Floors with Hard Floor Wax.

You cannot make a good job of waxing a floor unless you are in possession of a good weighted floor brush. Take floor wax in soft paste form as you find it on the market and apply it on the floor with a stiff brush as thin as possible to a space as large as you can reach with the weighted brush, and when the wax has set, go over it back and forth until a polish appears and keep on in that manner until patch by patch all of the floor is done. When hard, give a second coat, if you wish to produce a good job.

—776—

Cleaning a Neglected Waxed Hardwood Floor.

If the floor has become sticky and streaked with gray from the dust collecting thereon, do not try to clean it with soap suds or with ammonia and water, but procure some steel wool, No. 1 will do. Take a bunch of this in your hand and dip it in spirits of turpentine and go carefully over the floor, using cotton waste to wipe up the removed old wax. Then give a fresh coat of wax in the usual manner, using a weighted floor brush for polishing. If this does not fill and make the polish stand out well, apply another coat. To keep the floor in good condition it should be gone over once a week, or at least every two weeks with a mixture of equal portions of sweet oil, turpentine and vinegar, rubbed on well with soft cloth. Another soft cloth is then used to give the polish, and it is best to wrap this around a floor brush, making the work less tiresome.

—777—

Paint or Varnish for Hardwood Kitchen Floors.

What kind of finish would you advise for a hardwood floor, say cherry or Georgia pine, in a kitchen, one that would stand most wetting, as is the case in kitchens?

Unless the finish is to be in the natural, we should prefer a floor paint to a varnish proposition. If the floor is a new one, we should advise a first or priming coat of pure white lead in oil, tinted to approximate the final coat in color and thinned with equal parts raw linseed oil and a good turpentine substitute, if you think the price of genuine turps too high, adding enough japan to make the paint dry over night. The paint for this coat must not be mixed very stout and must be brushed into the wood thoroughly. This is especially required in the case of hard pine, otherwise the finishing coat is apt to be thrown off by continued wetting. For the next coat or coats we should advise zinc or lithopone ground in oil (paste form) if a tint rather than solid color is desired, and oil color, as for instance, lampblack for lead color or gray, yellow ocher for buff, ocher and Venetian red for salmon, burnt sienna and ocher for light brown, etc. To one gallon of such paste add one-half gallon best brown japan, beating both to a mass of the consistency of semi-paste, adding some turps or turps substitute, and finally thin to brushing consistency with hard gum varnish, one that by itself would dry hard in from ten to twelve hours, but which need not be a turpentine varnish, as that would be too high priced. Two and a half gallons of such varnish will be sufficient to make four gallons of paint. If you wish a solid color, like a dark brown, use burnt Turkey umber in oil and thin in similar manner with japan and varnish. For red, use Venetian or Indian red, according to shade desired, or yellow ocher for dark buff.

Where quick drying is required and the cost is not prohibitive, a few coats of colored shellac varnish will give very good service. For this purpose denatured alcohol shellac varnish, which is now moderate in price, will serve as the vehicle, and may be colored with dry pigments, such as finely powdered French yellow ocher, burnt Turkey umber, pure English Indian red, Venetian red, raw or burnt Italian sienna, to which may be added dry zinc white if the color is to be subdued. One pound of the colors named, if pure, will be the maximum amount for three-quarters of a gallon shellac varnish and one-sixteenth gallon denatured alcohol, and when mixed the color and varnish should be strained through cheese cloth or paint strainer. If the floor is an old one and much worn, whether finished before or not, the first or ground coat referred to is still more of a necessity, whether the finishing coat or coats be of the floor paint or colored shellac varnish variety. For a new floor, however, the priming with paint may be dispensed with in case of the shellac varnish finish, as the colored shellac acts in the nature of a filler for the hard woods mentioned. In case either of the treatments mentioned are undesirable and the floors are to be finished in the natural, we should advise at least one coat of denatured alcohol orange shellac varnish and two coats of hard gum floor varnish furnished by any reputable varnish manufacturer, who will advise you as to the method of treatment in application, etc.

—778—

Filling Hardwood Floor with Paste Filler.

D. A. A., Sherburne, N. Y., wants to know if in filling a hardwood floor with paste filler it is necessary to rub the filler into the pores and also to rub off the surplus of filler from the surface.

Answer:—To fill a hardwood floor the process is similar to that of filling any other hardwood surface; that is, the paste filler is thinned to the consistency of a heavy bodied varnish and applied with the brush. When it has set the surplus is wiped off across the grain with tow or excelsior shavings, etc., and permitted to harden before varnishing. On very open grained wood it sometimes requires a second coat to fill properly.

—779—

Shellac Varnish in Place of Filler on Oak Floors.

D. A. A., Sherburne, N. Y., asks:—Would an oak floor stained, shellaced and varnished or waxed stand wear without using a filler? Also would four coats of shellac varnish stand wear better; that is, last longer and make a better finish than two coats?

Answer:—Oak being open grained, requires a paste filler, as it would take a number of coats of shellac varnish and a lot of sandpapering to obtain a filled surface by using shellac varnish in place of the filler. As to wearing, we should prefer a good mineral paste filler to shellacing, though one coat of shellac varnish over the filler before varnishing would produce a better finish. We certainly believe four coats of shellac varnish would give better wear than two coats, and are satisfied that it will produce a much better finish, but the third coat should be sanded.

—780—

Finishing Oaken Floors After Filling.

When the floors have been filled with paste wood filler and coated with shellac varnish, finishing with good hard floor varnish, two coats will give good wear and service, and where not much used is really best, as you say. Waxed floors, however, can be brightened up at small cost from time to time by unskilled labor and in short order, but they must be filled only with paste filler and then given at least two coats of floor wax, but no shellac varnish.

—781—

Finishing Hardwood Floors, Dull or Gloss.

We have always been of the opinion that an oaken floor should first be sealed with a good mineral paste wood filler and then be first coated with a good shellac varnish. The further proceedings to depend on the specifications or on the price paid for the work. If a dull finish is wanted three coats of a high grade floor varnish should be applied, the last coat being rubbed with crude oil and pumice. A floor so treated will look better and wear longer than one that has been given only two coats of varnish without rubbing the final coat. The dull finish will not mar so readily as high gloss finish, and looks less vulgar. While the varnishes that produce a dull or flat finish without rubbing may be all that is claimed for them on interior wood work we do not take any stock in their wearing qualities when it comes to floor finishing and much prefer the old method of rubbing and polishing the finishing coat. The principal feature in varnishing a floor is to permit every coat to dry very hard before applying the next and that the varnish is a true hard gum varnish.

—782—

Should Hardwood Floors Be Oiled Before Waxing?

The usual custom is to stain floors before waxing, with oil stain, but it is not necessary to oil hardwood floors previous to applying the wax, and it certainly is out of the question to oil a waxed floor to stain it. Oiling floors is not resorted to much these days, because the oil causes the wood to darken so much, hence waxing without first oiling is preferred.

—783—

Treatment for Soft and Hardwood Floors.

It depends very much upon the condition of the floor and on the price obtained for the work as to how they can best be treated or renovated. The ob-

ject is, or should be, to give them a durable, elastic, yet hard, coating, be it paint or varnish, that will resist hard wear and tear showing the least possible amount of scratches and other marks.

If the floor has been painted before or is too much worn to be finished in the natural, the only way to refinish or treat it is to give one or more coats of a good floor paint of the color that is most in harmony with the surroundings in the room.

If the floor is in the natural finish or had been previously stained and varnished, but is still in fair condition, the worn coating is best removed with a good quick paint and varnish remover and cleaned up as directed or it can be removed with steel wool. Take off the roughest part with steel shavings and follow with steel wool No. 1 or No. 0 for very fine work, then proceed as follows:—

For soft wood floors, if it is desired to color them, stain first with a good oil stain and allow to dry. Then apply at least two coats of a good floor varnish, permitting one coat to dry hard before applying the next.

For hard wood floors apply either a good coat of white grain alcohol shellac varnish or fill with paste wood filler thinned with turpentine, but if a finish like golden or antique oak, brown oak, etc., is desired, the proper stain must be first applied, after which it is filled as in the natural, and when dry rub steel wool or sandpaper, clean up and either apply a few coats of good floor varnish or give two coats of floor wax, each coat rubbed with a weighted floor brush. When wax is used a light coat can be applied at least once every few weeks, keeping the floor in good condition.

For hard maple or parquetry floors the best treatment is to give three coats of white shellac varnish, allowing each coat to dry before applying the next.

Liquid fillers should not be used on floors unless made from hard gums and sufficient oil to make them elastic and water resistant. On close grained hard wood or on yellow pine floors two coats of floor wax may be used without previous filling.

—784—

Floor Oil or Floor Polish.

There is a vast difference between floor oils and floor polishes. Floor oils are usually applied to the floors of public halls, warehouses and stores to keep down the dust, while floor polishes are used in dance halls, school rooms, churches and some of the finest private residences. The commercial floor oils, sometimes called "no dust" or "dust down," are best made by taking pale paraffine oil of medium body, heating it gently, and to each gallon stir in one pound of previously melted hot paraffine wax of a melting point not lower than 130 degrees F. Make sure that the oil and wax are well combined. This oil is applied with a long handled brush and allowed to soak well into the wood. For smooth hard wood and parquetry floors there is nothing better than floor wax in the form of soft paste applied with a brush and polished with a long handled floor brush. It is most economical to purchase the prepared floor wax that is offered by any number of manufacturers rather than go to the trouble to prepare it at home in a small way and risk damage by fire.

There is still another class of oil used in keeping varnished floors in good condition. These oils are practically the same as furniture polishes or varnish revivers, and are intended to be applied with a mop or cloth made slightly damp with the oil, and then wiped or polished with a dry cloth. They clean a varnished floor as well as polish it, and are usually used by the housemaid in the same manner as she would use a cloth dampened with water.

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Floor Oils for Warehouses, Storerooms, Etc.

What dustless floor oils, such as No Dust, Dust Down or similar preparations usually consist of and what their advantages are in comparison with floor paints, waxed floors or varnished floors.

When these oils were first placed on the market they were mixtures of machinery oil, neatsfoot oil, rapeseed oil and sometimes linseed oil. Their function was to keep the dust caused by the constant moving of the feet of operatives or patrons, of trucks, etc., from constantly whirling through the air. Later on it was found that mineral oils served the purpose far better than the mixtures referred to, and that the cost was much less. Mineral oils of the proper specific gravity were found to penetrate more into the pores of the wood, remained moist for a longer time, therefore, take up dust so much longer and the floor does not require cleaning with lye so often. It is obvious that these floor oils are not tending to make floors a thing of beauty, and this, together with the risk of soiling dresses, etc., is the reason why they have not found favor in residences, but are used to advantage in some public halls, business localities, schools and barracks, etc.,. Even here, since the advent of cement and tile floors, their use is becoming limited. There are two kinds of floor oils on the market, one of these being unmixable with water, while the other can be emulsated with water in most any proportion. The latter consist of mineral oil to which are added organic oleic acids, and this feature permits their mixing with water. An emulsion can also be brought about by mixing caustic soda lye of 38 degrees B. specific gravity and a similar quantity by weight of denatured alcohol, adding as much of this to the oils, while stirring, until the oil loses its turbidity and forms a permanent emulsion, so that no drops of oil are visible on long standing. This water soluble oil is added in the proportion of 10 or 15 per cent. to the scouring or spraying water, which, when the floor has dried, leaves a very thin film of oil on the floor, which mechanically binds the dust. While this latter method leaves floors in much better appearance than the use of the insoluble floor oils, it has the disadvantage of requiring more frequent treatment.

Whenever there is a great amount of dust the insoluble floor oils are preferable to those miscible with water.

There are also preparations offered to keep down the dust in the places named that are sprinkled on floors and swept up after being allowed to remain overnight, and these consist of absorbent materials, such as fine sawdust, talc, soapstone or sand moistened with mineral oil of light specific gravity, or mineral oil emulsions.

—786—

Waxing New Oak Floors.

While the work is somewhat tedious, the operation is very simple. Any good floor wax on the market is applied with a stubby brush until the pores and grain are filled, and when about to set the wax is rubbed into the surface with a weighted floor brush specially made for the purpose until the surface shows a uniform polish. When the first coat has dried fairly hard a second application is given in the same way as the first.

—787—

Preparing Old Waxed Floors for Painting.

Wanted to know the best way to clean old floors that have been waxed for a number of years, so that paint or graining ground will dry hard on the floors and give no trouble by softening from the effects of the waxing.

If the wood of which the floors are made is an open-grained variety, it is a difficult matter to remove the wax out of the grain and pores, but at any rate the best way is to remove the wax with sharp scrapers and then scrub the floor with a mixture of twelve parts fine sand, eight parts soft soap, and four parts sifted lime, all by measure, using large scrub brushes with handles and warm water. When well cleaned in this way, rinse and mop up the floor with warm water, and permit to dry. If there are any open joints or cracks, run along the edges of same with a fitch filled with such paint as you intend to use for first coat, and when this has set, putty up with putty of similar color, or use floor-crack

filler as supplied by paint dealers. Paint for the first coat, whether intended for finishing the floor with floor paint or by graining, must be made with very little oil and a strong drying japan, thinned with turpentine, so as to dry nearly dead flat to a hard film. Only on such a ground will the finish give the desired result.

—788—

Waxing a Dancing Floor and Cost of Same.

If the floor is of maple or Southern pine filler is not required previous to waxing, but in order to make a good job two coats of floor wax are required. You cannot purchase a good floor wax for less than forty cents per pound, and one pound will not cover much more than ten square yards of floor space on first coat. The wax is applied with a stubby brush and it will take a man at least one hour to apply and rub it in as it should be on the ten square yards. When the wax has set, which is shown by its dull appearance, the weighted floor brush with long handle comes into play to give the polish required. One man cannot properly go over ten square yards in less than two hours. So that the labor for the first application of wax costs 75 cents, and 40 cents for the floor wax, makes the cost for material and labor \$1.15, or 11½ cents per square yard. We should think a price of 15 cents for square yard for first coat of floor waxing very reasonable. For a second, when required, a price of 10 cents per square yard would be ample compensation. It is not always necessary to apply coats, as in many places powdered floor wax is sprinkled over the floors after the first waxing has been somewhat worn. Different conditions require different treatment, and what we have stated here is merely a sort of guide to figure cost by.

Note:—These prices do not apply at the present time as the cost of labor and material has advanced.

—789—

Laying Linoleum on Cement Floors.

For this purpose a special cement is required, unlike that which is used for wood. A very good composition is composed of fifteen parts by weight of manila gum, twenty parts by weight of common rosin and forty-five parts of thick turpentine (gum thus or gallipot), that are heated until liquified, when the mass is thinned with twenty parts of denatured alcohol. Another less expensive composition is prepared by dissolving sixty-five parts ordinary rosin, ten parts of rosin oil or castor oil in twenty-five parts of denatured alcohol, or in twenty-five parts of heavy petroleum spirit (known as turpentine substitute). Either of these compositions can be used without previous heating and are fairly resistant to surface moisture. If a small percentage of India rubber is added while melting the rosins the compositions can be rendered moisture proof. Another composition, which must, however, be heated before use, is made as follows:—Thirty-five parts rosin, sixty-five parts gallipot, sixty-five parts artificial asphaltum, fifteen parts liquid coal tar, ten parts oil of tar and ten parts rosin oil.

—790—

Finishing Hardwood Floors by Varnishing.

The most essential thing in floor finishing, next to the selection of the right sort of varnish, are:—First, to see that the floor is absolutely solid; that is, there must be no give to it when stepped upon, for if such is the case it will crack the finish in a new floor, while in an old refinished floor it will break the finish and will work the filler out of joints. Second, the floor must be perfectly smooth, clean and dry, otherwise a good finish cannot be obtained, even with the very best material. For treating new floors, such as hard or close grained woods, like oak, chestnut, maple and hard pine, the best way is to fill open grained wood with a good paste filler, and when this is done, give a good thin coat of floor

varnish, giving ample time to dry hard, and sandpaper; follow, after dusting, with a good, full coat of varnish, and for a right good job give a third coat. If this is to be rubbed, let it dry hard throughout, then use crude oil and pumice. For hard pine use one coat of shellac before varnishing, so as to keep back the sap or pitch. The chief requisite for good wear on a finished floor, however, is the selection of the varnish, which must not readily mar or scratch on being walked over.

To refinish an old floor the first thing is to get rid of the old finish or whatever may be left of it, and here is where the difficulty lies. If it can be removed with a scraper or an old plane, it is not such a bad undertaking, but when a remover is used it has to be got rid of, and if not done thoroughly there will be no end of trouble. Otherwise proceed same as for a new floor, excepting as to filling, which is not necessary, but there may be most likely cracks and open joints, caused by the shrinkage of the lumber, that require filling, and for this purpose we would suggest one of the non-shrinkable crack fillers on the market.

—791—

Treatment of Linoleum to Preserve It.

Ordinary varnish, such as is used for woodwork, is unfit for use on linoleum, and in order to preserve it it must never be washed with soap and water or dilute ammonia. When it requires to be cleaned do it with a good floor wax, which will preserve it and render it lustrous. Make a mixture of two parts boiled linseed oil and one part turpentine. Apply this at night and wipe surplus off with soft cloth in the morning. If it be worn somewhat it may be renewed with an oil stain of the color desired. This is applied with a soft brush, and when dry floor wax or the above mixture of oil and turpentine may be applied over it.

—792—

Should Linseed Oil Be Heated When Applied to Maple Floors?

If a maple floor is to be kept from becoming dark or unsightly in time, it should not be oiled at all, but at least two coats of bleached shellac varnish should be given first; then, in order to make it wear well under severe conditions, a mixture of nine parts raw linseed oil and one part pale japan should be applied over the shellacked surface. When, however, eventual discoloration is not objectionable, the shellac may be dispensed with and raw linseed oil used directly on the wood. The idea of heating the oil was to make it more fluid, so as to penetrate to a greater degree.

—793—

Treatment of Maple Floor of a Dance Hall.

Maple floors do not require filling. When used for dancing the very best thing is to give them several coats of prepared white floor wax, using a weighted floor brush for polishing. While filling is not required, one coat of white shellac varnish will make a good ground for the wax, but the wax will itself make a good filler. When a maple floor is to be varnished in order to keep it light in color three coats of white shellac varnish should be applied and if subjected to hard wear, as for instance dancing, a coat of special floor oil made of nine parts raw linseed oil and one part japan drier, well rubbed in over the shellac varnish with a weighted brush, will preserve the varnish and present a better finish for dancing, not being so slippery, but having a dull smooth surface. As the floor becomes worn it should be gone over at least every few weeks with a floor oil made up of seven pints raw linseed oil, two pints turpentine and one pint of white shellac varnish. This should be applied with a brush and then rubbed in with a cloth wrapped about a weighted floor brush so that it will not remain sticky.

—794—

Wax Finish for Oak Floors.

Take pure country beeswax, cut it up into shreds and dissolve in pure spirits of turpentine. Use a hot water bath to hasten the solution, but avoid the use of an open flame. For new work have the wax of the consistency of a medium soft paste which will aid in making a good, even surface over the paste filler. Do not try to polish on this first coat, but apply the wax much thinner, like a varnish, and when this coat has well set, polish with a weighted floor brush with long handle. Apply the wax with a brush, as you would a filler. If you do not care to go to the trouble of preparing your own wax you had best buy one of the reputable brands of floor wax offered by manufacturers, which your supply house can furnish in prepared form.

—795—

Finishing New Floors in Wax.

Oak floors make the best job in wax, but other hard woods, like maple, chestnut, etc., may be finished that way. Make your own floor wax by shredding beeswax, dissolving it in a water bath with turpentine, but we would advise you to purchase floor wax from a reputable supply house or manufacturer and follow directions. No filler or varnish should be used, the first coat of floor wax acting as the filler, the second coat as finish. The wax is applied with a varnish brush and then gone over with a weighted floor brush with a long handle, until the proper polish is obtained.

—796—

Floor Oil That Does Not Become Gummy.

Formula for preparing a floor oil that can be applied with a mop and will not dry up and become gummy like linseed oil, something on the order of the advertised floor oil polishes:—

Floor oils of this kind are most always prepared by thinning down paraffine oil of .865 degrees specific gravity, and melt in the hot oil paraffine wax substitutes, or possibly a little solvent naphtha or denatured alcohol, in order to make the oil penetrate more readily and make it work more freely with the use of the mop.

The best and most serviceable floor oil is made by heating gently pale paraffine oil of .865 degrees specific gravity, and melt in the hot oil paraffine wax one pound of the chipped or sliced wax to each gallon of the oil, setting it aside to cool after the wax is well combined with the oil.

If heating the oil is not convenient, simply take paraffine oil of medium body, say .903 specific gravity, and mix it in the cold way at the rate of four quarts of oil with one quart spirits of turpentine or one quart of 56 degrees Be. petroleum spirits, but do not use ordinary benzine or gasoline. When using the wax and paraffine oil mixture or the oil mixed with the petroleum spirits, a few drops to each gallon of the oil of myrbane (synthetic oil of almonds) or of the oil of cloves will disguise the strong odor of petroleum to some extent. Remember, however, that to be successful in oiling floors depends upon the manner in which the oil is applied, and the amount of elbow grease expended in the work. Do not use the brand of paraffine oil designed as red, nor one of extra heavy viscosity.

—797—

Varnish for Maple Floor in a Garage.

For a maple floor in a dwelling or hall where the floor has no hard wear and should be kept as light as possible, two or three coats of white shellac or one coat of hard maple finishing varnish, a finish over two coats of shellac varnish

is just right, but it must be remembered that in a garage there is a liability of the spilling of not only grease and lubricating oil, but also water and gasoline. Therefore, shellac varnish had best be omitted altogether and the floor given a first coat of linseed oil, with the addition of pale drier, and permitted to dry thoroughly hard, followed by two coats of the very best grade of floor varnish that is obtainable.

—798—

Removing Wax from Wooden Floors.

Apply either benzine or gasoline to the floor liberally, which will soften the wax. Repeat this treatment, if necessary, then take a good stiff scrubbing brush, dipped in the liquid, and if the proper amount of elbow grease is applied the wax will yield, when it may be scraped up or mopped up with coarse rags. When all the wax is taken up, go over the floor again with a cloth saturated with benzine or gasoline. Have plenty of ventilation and have no flame in the room. A good floor brush with long handle will make the work easier. Be careful to remove all the dissolved wax, if you wish.

—799—

Finishing and Refinishing Worn Hardwood Floors.

A. C. K., Pennsylvania, asks:—What is the best way to finish hardwood and yellow pine floors, also the best way to refinish yellow pine and maple floors, that were stained dark oak and waxed and are now worn in spots.

Answer:—For new floors of hard wood we suggest the use of paste filler if wanted in the natural, or, if desired to imitate darker woods, the use of a good oil stain, followed with paste filler, colored to match the stain. After rubbing off the surplus filler, sandpaper should be used, the surface well dusted and given at least two coats of good floor varnish. For yellow pine a filler is not required, but at least one; preferably two coats of orange shellac should be applied, followed by a coat of floor varnish. Yellow pine floors, when wax finished, do not require shellac varnish, but two coats of hard floor wax, the first coat to act as a filler, the second coat as a finish. The best work is done with a weighted floor brush with long handle.

To renovate worn places in yellow pine or maple floors, that have been stained and waxed, take a sharp steel scraper and remove carefully the remaining wax coating, clean to the wood, then stain and wax again, after which it will be well to go over all of the floor with a light coat of wax.

—800—

Oiling a Hard Pine Floor to Dry in 24 Hours.

Mix equal parts by measure of pure spirits of turpentine and concentrated japan drier and add one quart of this mixture to three quarts of double-boiled linseed oil. Apply this to the floor with a four-inch flat brush well rubbed into the wood, not slushed on, and if you give the room plenty of free air the oil will dry in less than 24 hours when there is not too much moisture in the atmosphere. If not in a particular hurry you may secure a better finish by using a pint only of the turpentine and japan mixture to seven pints of the boiled linseed oil.

—801—

Cleaning and Preserving Linoleum.

Correspondent says that he asked a painter for the best way to brighten up high-grade floor linoleum in a dining room, and was told to have it scrubbed with soap and water, then rinsed with clear water, using a soft sponge, and after drying to apply a coat of white shellac varnish.

If you wish to have the linoleum lose its life, crack and become unsightly, especially about the figures, follow the advice given you; but any reputable and experienced linoleum manufacturer will tell you that linoleum laid on floors requires being fed with a coating of linseed oil from time to time, in order to prolong its life. This being too slow to satisfy housekeepers, who do not care to let a room stay idle long enough for the oil to harden or have it dust free, the best way is simply to rub over the floor once very fortnight with a solution of beeswax in turpentine, rubbing it frequently over with an old silk handkerchief to keep it free of dust.

—802—

Hardwood Floor Finish That Does Not Show Scratches.

The party that claimed to have a knowledge of mixing bleached shellac and alcohol with a substance that would prevent shellacked floors from showing white marks or scratches is simply making a bluff for the purpose of securing trade, while it lasts, trusting to good luck. Good hard gum shellac in alcoholic solution, when properly applied, will dry so hard that it will not scratch or mar readily, and when suitably colored will not show white marks, even when scratched. Here are a few formulas for making shellac varnish that admit of free working and easy application:—To five pounds bleached shellac add two pounds Venice turpentine (clear quality is best) and two gallons of refined wood alcohol of 97 degrees proof. Cologne spirits being too high for cost, and denatured spirits are rather uncertain in their solvent property, we suggest as the best a mixture of 1 gallon each cologne spirits and wood alcohol. Put the shellac, the Venice turps and the spirits in a large crock or jar, cork up well and put in a warm place, and from time to time stir with a clean paddle until the shellac is dissolved, and the varnish is ready for application. The gum shellac furnishes the hardness and the Venice turpentine the elasticity. A trifle of aniline color, known as spirit soluble, added to the finished product, will keep the varnish from becoming too opaque and keep the finish from showing scratches.

A darker varnish to be serviceable for hard wood floors of the antique oak type of color can be made on the same principle by using 4 pounds orange shellac gum and 2 pounds Venice turpentine to 2 gallons of spirits. A trifle of spirit soluble Bismarck brown will give the required coloring.

SIGN PAINTING.

—803—

How Dead Outlines Are Produced on Gold and Silver Letters on Glass.

Pounce the outline of the letters on the glass, then draw in your outlines with varnish size, and when this is dry, apply the isinglass size over all, then lay your leaf and burnish as usual in glass gilding. The gold or silver leaf will be matt where the outline has been drawn with the varnish size, and lustrous on the rest of the work. Do the work after penciling in the outlines exactly as you would in ordinary gilding on glass.

—804—

White Lines Around Gold Letters on Glass

In laying gold leaf on glass, what is used around the edge of letters that produces the white line that gives it the finished effect?

Sometimes the effect you refer to is obtained by double gilding, the first layer being placed next to the glass and burnished, then a second layer of matt gold is put over, this extending over the first, so as to give the whitish line referred to. But this is rather difficult work, which requires much practice. In laying the above-mentioned second layer of gold, which is to be matt (flat), ordinary varnish is used in place of the isinglass size, and the gold is not rubbed with cotton, as in the first layer. The simplest way, however, to produce what you desire is to clean up your gilding, and after backing up the gold letters in the usual way, take flake white mixed in pale varnish and a little turps, which may be slightly tinged with lampblack, and draw your lines around the letters with a suitable striping pencil. This, of course, refers to gilding done on the reverse side of the glass. If done on the right side the letters are first done in white by using flake white as above, and the letters are pounced upon the white, so that the gold, when laid, will show the white lines you speak of. In most cases, however, the white line is applied with the pencil, as stated above.

—805—

Size for Aluminum Bronze on Glass.

The question was asked what size is mixed with white tube paint applied to store windows and shortly after dusted over with aluminum bronze powder?

You refer, no doubt, to a gold size japan that is mixed with flake white to give it opacity and the required tack for the bronze. Mix artist's flake white with pale gold size fairly stout and add a trifle of drop black to make a faint pearl gray tint, apply your letters or ornaments with this to the well-cleaned dry glass, and while the letters or ornaments are still tacky, apply the bronze with a cotton dip, and when on a sufficient length of time to set, burnish the letters with a bunch of cotton. When all is dry and hard, clean the bronze off from the window, but not before.

—806—

Laying Out Lettering on Glass for Gilding.

For marking on glass, crayons cut into suitable pieces from French chalk will do the work. Of course, the glass must be dry and clean. You should surely be able to obtain these crayons from any artist supply house. Ask for French chalk crayons. The best way is to have the sketch made on paper and

place this on the other side of the glass, then size the spaces that are to be gilded with isinglass size, and when the gilding is done, pounce the outlines on the gold and apply the backing of color, and when this is dry wash off the excess of leaf. If the letters or figures are to have lines or shadows, the excess of leaf must be removed first. For pouncing precipitated chalk is best.

—807—

Gold Lettering Coming Off Glass by Frost.

John Murphy, of Murphy & Son, Montreal, Canada, wrote:—

I have had many years' experience in our rigorous climate as a sign painter, and have tried all methods of protection. I have not found any that will resist the action of frost on the glass, although by care in washing store windows I have had the work stand for seven or eight years. There is no real connection between the gilding and the glass, because the glass absorbs nothing. The gold is held to the glass by atmospheric pressure, and water finds its way between the gold and the glass when it lays on any length of time. In cleaning the windows I have seen that the space occupied by the lettering was wiped off with a damp chamois skin, no water being allowed to run over it. This method of cleaning will allow the lettering to remain on the glass for many years if it has been well backed up with carriage varnish. There is, in my judgment, no method of protection from frost, except keeping the frost off the glass. We do this in Montreal by ventilating our windows, which have sliding inner sashes.

—808—

Black for Lettering on Glass.

We prefer coach black ground in japan, adding rubbing varnish for binder, and thin with a little turpentine. When quick drying is not required, we prefer coach body varnish to rubbing varnish.

—809—

Removing Lettering from Ground Glass, and Lettering White Opal Glass Signs in Black.

A Philadelphia painter says that frequently he is called upon to remove the black lettering from the ground glass in office doors and meets with difficulty in removing the same thoroughly and quickly. Has found rubbing with pumice and water most efficient, but the impression still remains on the ground glass. Would also like to know how to mix a good black for lettering white opal glass signs, such as physicians place inside of their office windows, a black that will not wash off or blister in the sun.

The best solvent for removing quickly black or other letters from ground glass would be carbon bisulphide. A sponge moistened with the liquid and passed several times over the letters would remove them completely in a few minutes without leaving any mark. However, the odor is so offensive and poisonous that it cannot always be employed, and amylacetate, which has the odor of bananas, will serve in its stead. If the color is very stubborn, rubbing with pumice and water and a subsequent moistening and rubbing with amylacetate will remove all traces of the lettering. The material is somewhat expensive, but a time saver. Neither, however, should be employed near an open flame of any kind, as both are very inflammable.

As to a suitable black for lettering white opal glass signs, we consider ivory black, ground in japan, the very best material. Mix it as you would for striping, with a small quantity of pure turpentine to the consistency of thick varnish, then add, for one-half pound of the black one tablespoonful of best rubbing varnish and finally thin with sufficient turpentine to the proper consistency. Have it only stout enough to cover without running. Give two coats rather than have it too thick.

—810—

Fastening White Enamel or Gold Glass Letters to Glass.

The best cement for white enameled letters is made by running two parts by weight of pure white lead in oil and three parts by weight of sifted dry white lead through a paint mill with enough good outside or spar varnish to make a soft paste, which is then made into a smooth putty by adding enough finely sifted gilder's whiting. When the cement is to be used soon after preparation, well sifted air slaked lime may be substituted for the whiting. The letters should be so arranged that there is no air space back of them where moisture can collect and heat or frost will not remove them.

A good cement for fastening brass or copper letters to glass is made by boiling one part by weight of caustic soda, three parts common rosin, three parts air slaked lime and five parts water. This must be used within 30 minutes after it is taken from fire, otherwise it must be warmed up in a water bath before use. For fastening gilt glass letters to glass the following is highly recommended as being unaffected by heat, cold or damp:—Canada balsam, to which a little solution of bichromate of potash has been added. Or clear gelatine with the addition of bichromate of potash. In either case one part by weight of bichromate of potash to 50 parts of balsam or gelatine is sufficient. Pure casein powder dissolved in seven times its weight of silicate of soda of 33 degs. Be., soluble water glass, also makes a very good cement for fastening glass to glass.

—811—

Paint for Banner Work.

When it is desired to paint on silk, linen, sheeting or canvas, it is best to impregnate the parts to be coated with weak solution of gelatine, to which a little glycerine has been added, all over, but in silk only the outlines, which are to be shaded or gilded. The colors should be as flat as possible for first coat, yet not brittle, and therefore it is best to use tube colors that are ground stiff in oil and mix with elastic oil (oxidized linseed oil) and thin the same with turpentine in which has been dissolved pure beeswax, about 8 ounces to the gallon of turpentine. Too much drier must be avoided, but if such is required, a good paste drier is preferable to liquid drier or japan. The main thing is to avoid an excess of oil in the color. When these suggestions are followed success is assured in every instance.

—812—

Muslin Signs.

You can purchase the prepared muslin by asking for sized muslin for sign work. Or you can prepare it by stretching the muslin tight, going over it with a coat of ordinary starch of the consistency used in laundries. When this is dry, you can letter on it. Mix your color with quick drying varnish and coach japan, and thin with benzine, in which case the muslin need not be dampened.

If you wish to prepare canvas for painting, nail the canvas on a frame or stretcher, then give it a coat of thin glue size. When this is dry, apply a mixture of equal parts white lead and bolted whiting, thinned with boiled oil and raw oil, equal parts, to the consistency of artists' tube color and apply with a palette knife, smoothing off carefully.

—813—

Lettering on Cotton, Solid and Transparent.

The surface, where the letters are to be placed, must be first carefully sized with a weak solution of gelatine or white glue, to which a trifle of glycerine is added to keep it elastic. The lettering should be done with signwriters' tube

colors, which it is best to thin with boiled linseed oil, in a gallon of which has been melted one pound of white beeswax, and to which mixture is added sufficient turpentine to make the color dry semi-flat. This is important, as it will keep the color from peeling and yet elastic enough to keep it from breaking. Each succeeding coat should be held less oily than the preceding one, and the treatment will answer for linen sheeting, etc., as well. The chief aim is to prevent the color from striking through the fabric as little as possible, therefore it must not be oily. If the letters are to be solid use opaque colors; if they are desired to be translucent employ the transparent colors. For brushes those used for fine sign-writing will answer

—814—

Airbrush Lettering on Cardboard.

In relation to airbrush work on cardboard signs, the colors used must be ground extremely fine and should be thinned with sufficient drier to keep them from spreading, as they require to be thinned to the utmost, as otherwise they are apt to clog up the airbrushes. The colors, before filling the airbrushes, should be strained in order to flow freely, as small particles or lint will not pass.

—815—

Lettering on Muslin.

A new method that has supplanted an old one is that of lettering cotton sheeting signs by the dry process. For expediency in cloth lettering it has long since been agreed to generally that the dry process was in favor over the old, but to produce a black or color that could be applied without spreading into the cloth or leaving a stain surrounding the letters has been a subject that has engaged the attention of sign painters for a number of years. At last this has been found in the simplest mixture possible—best refined lampblack, mixed with an ordinary quality of furniture varnish to a thick paste and thinned with gasoline will give a black that will cover well and not spread. The lettering should be done with a soft, flat brush one inch or two inches wide. The black should be thinned to the consistency of cream, so as to spread evenly and freely, and yet possess good covering qualities. Dry colors may be mixed in the same manner. Cloth lettered by this process dries in a few moments.

Charles J. Allen, Scranton, Pa.

—816—

Lettering on Muslin or Canvas with Water Color.

A medium to use with water color for lettering on muslin or light canvas goods was desired that will permit of free working and stand a reasonable amount of rain without washing off.

Mix the color that has been ground in water without size, free flowing consistency with a medium prepared as follows:—1. In one clean dish heat one pint of water to the boiling point and add 2 ounces shredded beeswax; boil until the wax is liquid. 2. In another dish dissolve in one-half pint of water one-half ounce of white soap, and when all is dissolved add to the wax and water, which mixture keep on a boil a few minutes longer. This makes a milky emulsion. Make a glue size from white glue or gelatine by dissolving one ounce of glue in one-half pint of water, adding this to the emulsion. Water color so mixed will work freely and when dry will not wash out, unless by scrubbing, hence will stand considerable exposure. The water color will become still more weather-proof if immediately before use 5 drops of solution of bichromate of potash is added to every half pint of the medium. For use with white, white beeswax and white soap must be employed in preparing the medium.

—817—

Cotton and Tarpaulin Yellow and Black Signs.

Our inquirer wishes to know how tarpaulins may be colored yellow, painted with black, or lettered, so that the color or black will withstand the elements.

Eight or ten ounce cotton duck is the most difficult cotton material to deal with in painting or lettering, as cotton does not readily absorb liquid mixtures. The best known method to follow, either in painting or lettering linen canvas, cotton duck, cotton sheeting, etc., is to mix best refined lampblack, or dry colors, such as vermilion, cobalt blue, lemon chrome yellow, to a thick paste with a cheap grade of coach varnish and thin to working consistency with gasoline or naphtha. Black and light (orange) vermilion will cover well when reduced to the consistency of thin cream. Colors such as blue and green require a small quantity of ready mixed white lead to give the proper shade to the color and increase its covering quality.

For a gold color yellow for coating cotton, duck, or canvas, white lead (dry) should be used as a base; after mixing with light gear varnish add lemon chrome yellow, tempering with orange chrome yellow until the proper shade is reached.

The foregoing will resist moisture and withstand the elements as well as could reasonably be expected of any mixture aside from dyestuffs. In order to insure that the paint will cover on a large surface and not show streaks it is advisable to wet the material thoroughly when stretched with clear water. When the cloth is almost dry apply the paint. Colors, such as yellow and blue, require two coats. Black, if properly mixed, will cover on a large surface with one coat.

For oiled canvas and tarred cloth, also cloth made of hemp or jute, black and colors should be mixed with varnish and thinned with equal parts of boiled linseed oil and turpentine.

—818—

Lettering Peeling Off New Oilcloth.

Trouble was experienced with an oilcloth sign, which appeared all right until the sign was bent somewhat on hanging, when the letters peeled off. The cloth was black with high gloss and still somewhat tacky when lettered with white lead, quite flat with some japan gold size for drier, second and last coat with boiled oil.

The reason for the peeling must be laid to the tack of the oilcloth and the adding of japan gold size to the flat lead. The tack should have been removed by applying a coat of very thin japan and the lead mixed with brown or coach japan.

—819—

Lettering a Silk Banner.

A Long Island painter had the job of lettering a silk banner 3 by 4 feet and desired to know what colors to use and how to mix them in order that silk will not absorb the color at edges of letters.

If the silk banner is not subjected to moist atmosphere the size should be made by beating up 1 part white of egg with 2 parts water; otherwise it should be made by dissolving 4 parts white gelatine in 10 parts water, and in order to make it work freely two or three drops of glycerine are to be added to each tablespoonful of this size. On silk or satin only the outlines of the design must be sized and not the whole surface of the letters or ornaments. Still ground oil colors in tubes are best adapted for this purpose, and if they are still too oily for the first coat, which must be as free from oil as possible, place some of the color on blotting paper for a short time, and use a little turps to mix it for spreading. For succeeding coats add a little heavy varnish with the color and turps enough to make the color flow freely from brush or pencil. Use brushes or pencils with bristles as short as possible or trim to suit. If any part of the finished work should turn out matt or lusterless, go over all with a good elastic coach varnish of fairly pale color.

—820—

White Paint for Sign Work.

What is the best and most durable white paint for exposed signs?

If the signs are new and to be painted from the raw wood up to the finish we should suggest priming with pure white lead, raw linseed oil, a little turpentine drier and just enough lampblack to make a light lead color. For second coat also use pure white lead in oil, thinned equal parts raw linseed oil and turpentine, with a little drier and a touch of lampblack, having the tint nearly white. The third coat to again consist of white lead, thinned two-thirds raw linseed oil and one-third turpentine, adding a little drier. For the fourth, or finishing coat, would suggest a combination of pure white lead in oil and zinc white in oil, making 85 parts by weight of the former and 15 parts of the latter, thinned during the warm season with three-fourths raw linseed oil and one-fourth turpentine, and in cold season three-fifths raw oil and two-fifths turpentine with driers.

—821—

Best Black Paint for Outdoor Sign Work.

In our opinion and those of the great majority of the craft, pure well calcined lampblack is not only the most opaque of black pigments but also the best wearing and most durable, as has been pointed out on many signs known to have been exposed over thirty years, on which the white ground had entirely disappeared, while the black letters were still in plain evidence. Exterior wooden signs should be first primed all over with a priming of pure white lead mixed with raw linseed oil and a little drier, tinted with lampblack to a lead color, light if the groundwork of the sign is to be white, much darker if the ground is to be black. This will keep the wood from warping. If price will permit, a second coat of lead color, made from pure white lead, thinned with equal parts of raw linseed oil and turpentine, with the addition of the required quantity of lampblack and japan drier should be applied. For cutting in around letters to make a black ground, the best brand of pure lampblack in oil should be selected, thinned with kettle boiled linseed oil and japan, say one-half gallon of oil and one-half pint best japan to five pounds lampblack. If used for solid painting, instead of cutting in work, more oil and a little turpentine will be beneficial in making the black work more freely and uniformly. If pure kettle boiled oil is not obtainable in your vicinity, raw linseed oil with an increased portion of driers is preferable to the use of boiled oil of doubtful quality.

—822—

White Cement for Filling in Letters Stamped in Metal.

A formula for a material to be used in filling letters that are stamped in metal, a pure white that will stand the weather, was asked for. The work that the filling is to be used on is finished with a preparation of ammonia, so that it cannot stand much rubbing.

As ammonia will be used, white lead, which would make the best filling, cannot be considered. Take 1 part gum damar, 2 parts gum mastic and 2 parts gum sandrac, 1 part clear Venice turpentine, powder the first three in a mortar as fine as possible, then put in a wide-mouth bottle with glass stopper, add Venice turpentine and enough spirits of turpentine and coal tar benzol, the latter equal parts, to cover the gums, shake frequently and after a solution is had filter, adding more turpentine and benzol to make it pass through filter paper. Triturate in a mortar with zinc white to proper consistency. Dilute with benzol as required.

—823—

Lettering on Brass.

The process of lettering on brass in preparing the plate for the acid bath has become so simplified that the tedious method of cutting in has perhaps forever been relegated to the background.

It was discovered accidentally that after coating the brass or metal plate with a coat of asphaltum lettering placed on this would soften and completely neutralize the asphaltum. The portion so covered could be subsequently removed and the brass cleaned. Now we say, "Why didn't I think of that years ago?" We had the oft-repeated example of placing oil white lead on an asphaltum ground and have observed its effect; yet, to make a practical use of this bothersome inconsistency in paint combination never occurred to us.

Now, it may be asked by some, can you give the brass two coats? Yes, two or three coats, if necessary. The asphaltum must be properly mixed as well as the color that is used to letter on the asphaltum. After the neutralization of the asphaltum it should be removed with common whiting entirely free from lumps or gritty specks. The plate is then ready for the acid bath and the letters filled by the usual method.

Charles J. Allen, Scranton, Pa.

—824—

Filling Letters in Metal Signs.

The face of the sign and more especially the cavities made by the letters, figures or ornaments, must be well cleaned, so as to be free from grease, etc. The filling for black letters may be prepared by mixing black filler and lamp-black, equal portions, with equal parts of coach japan and rubbing varnish to a stiff putty like mass, which press into the spaces with a spatula that has been dipped into and is kept wet with turpentine. Let the filling extend slightly above the level or surface of the sign, and when it has become hard, level down with pumice and water. This done, the whole sign may be polished with rotten stone and oil. For white letters mix dry white lead with one part coach japan and three parts pale rubbing varnish to the consistency of soft putty and add to this enough fine calcined plaster or barytes to make it like glazier's putty and proceed as with the black. This putty may be colored with japan color to any desired tint.

—825—

Refilling Letters in Old Brass Signs.

To refill the letters in old brass signs on which the black filling has worn, cut out all the old filling and heat the plate. Then melt in a mixture of equal parts of asphaltum, shellac and lampblack, that have been powdered together, or, simpler still, melt in black sealing wax. Even up the surface with a warm flatiron. Scrape off the surplus and again hold a warm iron over the letters to glaze their surface. When dry and hard polish the plate with tripoli and sweet oil.

—826—

Galvanized Iron Bulletin Signs.

As an example we will describe the construction of a bulletin sign five feet high and twelve feet long. To construct this will require four sheets of No. 27 galvanized iron, thirty by seventy-two inches. A bulletin board of this size should be made in two sections. The frames should be made of one-by-four-inch white pine, turned on edge. One section should be fifty-nine by seventy-one inches and the other fifty-nine by eighty-two inches. This allows the iron to lap one inch over the splice. The frames should be braced by nailing a one-by-four through the center of each and another piece of one-by-four the other way. The two end pieces of the frame that come next one another in the center of the sign should be clamped together and three half-inch augur holes bored through them for the bolts.

After the frame is ready the iron should be nailed on, the second sheet overlapping the first one inch. We will first cover the seventy-one-inch-wide section. Lay the iron on so that it projects one inch over the center bar, to cover the splice. Nail it fast with No. 6 wire nails—nailing the high places. Keep on till you have it all nailed down smooth. Put on the second width of galvanized iron, allowing it to lap one inch and nailing the same way. The eighty-two-inch section is covered in the same way, except that the iron is kept flush with the edge of the center upright. The next thing is the priming of the sign. The galvanized iron is first to be prepared by brushing over its surface a solution of two handfuls of sal soda in a half gallon of water, with a dash of ammonia added. When this is dry the iron is to be washed with clean water and wiped off with a large linen towel wrung dry in clean water.

The board is then to be primed both back and front with 3 parts dry lead by measure and 2 parts iron-clad paint, wet to a thick paste with 6 parts raw linseed oil, 1 part extra coach varnish and 1 part coach japan, thinned down ready for use with turpentine. After the priming is fairly dry bolt the two sections of the sign together, putting two washers on each bolt between the sections to allow for the width of a saw blade, so that when completed the panel will come together.

The next operation is to put a wooden band or frame round the sign, in order to give it a finish. This is made from one-by-six-inch white pine. The top and bottom strips are nailed on first, running the full length of the sign. Then the end pieces are put on. The band is not mitered. About half an inch inside of the outer edge of the band a molding of some sort should be mitered round; a one and one-eighth-inch cove will probably look as well as anything. The woodwork should be sandpapered and given a coat of keg white lead, a little coach japan and a little extra coach varnish thinned with turpentine.

The next thing to do is to lay out the sign, using white chalk—the ordinary blackboard crayon. After it is all perfect, go over the outlines with a soft lead pencil. Then saw through the band and molding at the top and bottom, on a line with the upright joint between the two sections; take out the bolts and the sign can be finished in two sections. The coloring depends on the design and is entirely a matter of taste.

A bulletin sign of this character should be hung on four-by-four-inch posts, to which it should be bolted, the heads of the bolts showing on the face of the band, and the nuts on the back of the post.

H. J. McGrew.

—827—

Sheet Zinc Sign to Be Lettered in Gold Leaf and Smalted.

A painter has a sign to letter in gold leaf and to be smalted. The sign is of sheet zinc and he wants to know what material to use to make lettering and smalts adhere.

Get from your druggist $\frac{1}{2}$ ounce each of chloride of copper, nitrate of copper and sal ammoniac. Place the crystals in a glass jar or earthen vessel (not in tin or metal ware) and pour on them 1 quart of soft water, stir occasionally until all is dissolved, then add $\frac{1}{2}$ ounce of common muriatic acid. This makes a greenish solution, enough to coat 500 square feet of sheet zinc. You may keep the surplus for years in a well-stoppered bottle and use it with similar good effect on galvanized iron. Take a wide, soft flat brush and apply one coat of the solution on the side to be painted and the zinc will turn black, but on drying over night there will be a grayish film, on which you may apply your gold size and your paint for smalting, as you would on wood or iron, and you will have no trouble about it ever peeling. This has been done for the last sixty years without a single instance of failure.

—828—

Lettering the Head of a Bass Drum.

A local band wished to have the head of their bass drum lettered with the name of the organization. What material is best for the purpose? Three colors will be needed.

You cannot use either oil or water colors, as the former would be apt to peel, while the latter would not last long enough to go to the trouble of doing the job. We suggest that you take colors ground in japan, and thin the same with turpentine, as you would be lettering or striping on carriages or wagon work, adding a very little varnish. Two coats are required, the first coat should have a trifle more varnish to make it adhesive, while the second coat should dry with only a faint eggshell gloss. For black use a good drop black, for blue select ultramarine and for red use English vermillion, dark shade. Whatever color you select for the body of the letters, use an appropriate color for shading.

—829—

White Water Paint for Lettering Black Cardboards.

The window dresser of a department store asked what is the best material to use in making a white water paint for lettering on black cardboards.

Zinc white, ground stiff in water, without size, such as can be had in glass jars at any good supply house under the fresco or distemper color, to which enough gelatine or glue water is added to work free from the brush, will be the best material for the purpose. If this does not flow free enough, a few drops of glycerine may be added. This white preparation is unaffected by dripping water, but can be removed by rubbing over with a wet sponge, when desired. It can also be made by heating up dry zinc oxide in glue water, but will not work as smoothly and requires too much labor.

—830—

Water Color Gold Bronze for Show Cards.

A formula for making water color gold to be used on show cards was wanted. The inquirer had been using a bronze powder mixed with water, gum arabic, glycerine and alcohol, but after drying the bronze dusts off.

Dissolve parchment or the best Russian isinglass in hot water in a clean porcelain dish, using a water bath. One drachm of parchment or isinglass is sufficient for one-half pint of water. If any scum forms on top skim it and filter the solution through fine muslin before it becomes cold. In order to make the bronze flow freely on the cards, add one-half teaspoonful of refined glycerine. Gum arabic is very good for a medium, but does not bind sufficiently on drying. If you desire to keep the isinglass solution for any length of time, add a tablespoonful of spirits of wine to the quantity named.

—831—

Free Hand Relief Work on Cardboard.

In order to make free hand relief material adhere to cardboard, you will have to stop suction by applying spirit varnish, made by dissolving gum sandarac and gum mastic, equal quantities, in grain alcohol. One ounce each of gum sandarac and gum mastic, dissolved in one and one-half pints alcohol will do the work. Glue size is apt to throw off the relief and therefore should be avoided. The relief material is best made by mixing one pound freshly calcined plaster of Paris, one-quarter pound bolted dry white lead, mixed with water, in which has been dissolved two teaspoonfuls of bicarbonate of soda to the pint of water. This makes the relief material set more slowly and, therefore, work more freely. When the mixture has been made, fill the bulb immediately and work out your design that you have previously drawn on your cardboard. If you desire to color your material with pigment, that cannot stand soda, use marshmallow root powder in its place, about one ounce for every two pounds of plaster of Paris, and the material will set slowly and become very tough on drying, and it will not crack.

A mixture of equal parts plaster of Paris and bolted whiting or china clay also make good relief material.

—832—

Lettering on Cotton Fabric.

Size the surface only, where the letters are to be placed, with a weak solution of gelatine or white sheet glue, to which a little glycerine has been added in order to keep it elastic. The lettering should be done with tube colors, which are to be thinned with pure boiled linseed oil, in which has been melted some pure beeswax, say one-half pound of beeswax to one-half gallon of the oil, and sufficient spirits of turpentine to make the color dry semi-flat. This is important, as it will keep the color from peeling and yet elastic enough to prevent it from breaking.

Each succeeding coat should be held even a little less oily, and this treatment will answer for linen, shirting, etc., as well. The principal point is to prevent the color from striking through the fabric as much as possible, therefore it must not be too oily. If the letters are to be solid, use opaque colors; if they are required to be transparent, select transparent colors. As to the brushes, use similar to those used in fine sign writing.

—833—

Process Employed in Making Chipped Glass Signs.

While various processes, such as etching with fluoric and French acid and chipping by hand have been employed the sand blast is now very extensively used for glass chipping and with far better success than is had by other methods, because it limits the area of the chipping and makes the edge of the chipped work sharp and definite in the outlines. The sand blast process is also used for grinding, frosting, incising, embossing and boring glass, as well as stone ornamenting, and in frosting or ornamenting various metals. That it is the only method for cleaning iron and steel from rust and mill scale is well known. Sand blasts are usually operated by a current of air, produced either by pressure or vacuum.

—834—

Filling for Letters in Brass, Zinc and Copper Signs.

The cement or filling for the letters of metal signs is made by mixing intimately equal parts of asphaltum, shellac and lampblack. The asphaltum and shellac must be powdered, and the mixture is applied by heating the plate and melting in the cement, smoothing it off with a warm iron. Scrape off the surplus carefully and hold a warm iron over the letters to glaze their surface. Black sealing wax will also answer the purpose of filling in, and the treatment is similar. If the signs cannot be heated, make a putty from dry lampblack, asphaltum varnish and brown japan and fill the spaces, pressing the putty well in with the putty knife, then clear the edges with turpentine. When the filling is dry, polish the whole plate.

All the ingredients given are to be dry; the asphaltum and shellac are powdered and intimately mixed with the lampblack and the mixture is melted into the letters by heating the plate. When well filled and cooled off, after removing surplus, the cement is smoothed with a warm iron and the plate polished.

—835—

Split Glass Signs or Frosted Glass.

Several years ago a new industry was started in Paris, France, that of producing hoar frost glass, which is covered with feathery patterns resembling those naturally produced on window panes in frosty weather. The glass is first ground either by sand blast or the ordinary method, and then covered with varnish. This varnish contracts strongly on drying, taking with it the particles of

glass to which it adheres, thereby producing the branching crystals of frost work. One single coat gives a most delicate effect, while several coats yield a bold design. A more simple method, however, is followed in this country. The glass need not be ground in advance and instead of using varnish, ordinary glue is employed, which, in drying, splits off irregular patches of the glass surface in the most surprising manner, giving rise to most charming frosted effect of infinite variety. Where "flashed" glass is used for the purpose (that is, a colored glass, having a superficial thin layer of colored glass on one side), the effect of the tearing loose of the colored layer in some places and not in others enhances the beauty of the resulting frosting.

—836—

Lettering on Wire Screen to Appear Solid.

If the lettering is to be done on closely woven fly screen, you require a paint that will fill the meshes solidly, which can be accomplished by holding your paint stout, using stiff paste colors, mixed with drier and a good elastic, heavy bodied varnish, so that it will at once fill the meshes and dry hard and thoroughly.

—837—

Size for Aluminum Leaf on Wood.

We presume what is wanted is a size to lay aluminum leaf on wooden signs or other objects. For exposed work we would recommend an oil size, composed of heavy boiled linseed oil, to which a little white lead is added. The oil must be stringy and have a good tack, as in oil gold size. If you cannot get such an oil, take ordinary boiled linseed oil, put in a shallow dish and heat it over a flame. When boiling, remove it from the flame, allow to cool and then return it, repeating this operation until the oil becomes thick like syrup; then set the oil on fire, let it burn about a minute and extinguish the flame with a close fitting lid. When cool, add the white lead and thin with a little turpentine. For a quick size use pale gold size japan and add enough white lead to take the yellowish color from the japan. Thin with a little turps. Proceed as you would in laying gold leaf in oil size.

—838—

Refilling the Black Letters in Brass Signs.

Clean all the old black out of the letters carefully, then heat the plate and melt black sealing wax into the letter spaces. Even the surface with a warm sad iron and scrape off the surplus. Finally hold a warm sad iron over the letters to bring out the glaze. A cement, which is used in the same manner as the black sealing wax, is made by mixing equal parts of asphaltum, shellac and lampblack, and melting this in the letters. Still another filling is made by taking equal parts of asphaltum, varnish and brown japan, with enough dry lampblack to form a stiff putty, which is pressed into the spaces with a putty knife and the edges cleaned off with turpentine. When the filling is dry the whole plate may be polished. The cement described first hardens as the plate cools off; the last one requires a few hours to become hard enough to polish over.

—839—

How to Apply Flock Properly to Cut-in Signs.

Proceed in the same manner as you would in smalting a sign; be particularly careful that your groundwork is dry and hard and not too flat, so that the flock will not stick to the letters. The color you cut in with must be heavy and slow drying, but not fat or greasy, or it will spread and produce ragged edges. Bear in mind, however, that flock should be used for sheltered signs only, and not for those that are exposed to the weather.

—840—

How to Prepare Smalted Signs on Wood or Tin.

To smalt a color or gold letter sign on wood or tin, prepare your ground so that it dries with an eggshell gloss that will not allow the smalts to stick to it. Cut in around your letters with heavy color of same shade as your smalts, but do not have it fat or greasy, or it will spread and make ragged edges. Your color for cutting in must be slow drying, however, and for black it is best to use lamp-black in oil, to which a little good drier is added. When you have cut in your sign, lay it on bench with large pieces of paper under it to catch the surplus smalts; put your smalts in a sieve of proper mesh and sprinkle until the entire surface is covered, then turn over the sign to remove the loose smalt and let stand aside to dry. There is no special size required for smalting a sign, the binder to hold the smalts in place being the heavy, slow-drying oil color mentioned above.

—841—

Asphaltum and Brunswick Black for Glass Embossing and Signwriting.

What kind of asphaltum should be used in etching glass signs with hydrofluoric acid. Can it be T or B grade? What is Brunswick black quoted by writers on sign painting and glass embossing? Where can I obtain suitable canvas for scene painting and netting for cut cloths? How should canvas be sewed to best advantage?

T and B asphaltums are designations showing materials with which asphaltum varnishes are thinned, T standing for turpentine, B for benzine. Either will do, providing they are stout enough in consistency and made up from pure asphaltum, but we should prefer the T grade as most likely to be free from rosin. For your purpose the best is none too good and you must not look for low-priced goods. Brunswick black is a black varnish made by melting pure asphaltum in a kettle of cast iron to which a certain quantity of linseed oil boiled with litharge until stringy is added, the whole boiled until it will set hard, when a sample is taken and placed on glass. When nearly cool the mass is thinned with turpentine. This is really a true asphaltum varnish of high grade. It was termed Brunswick black by English varnish makers.

—842—

Size for Lettering in Gold Leaf on Silk Banners.

Take care that the silk is not made brittle by the size, therefore the best thing to do is to dissolve 4 parts of clear white gelatine in 10 parts of clean water, and add 2 or 3 drops refined glycerine to each tablespoonful of the size. With this size only the outlines of the design to be gilded are to be marked, while the field should be filled in with colors in oil, such as are offered to artists in tubes. If these are too oily, draw the surplus oil by placing the color on blotting paper and then mix it with a little turpentine to make it work smooth. This will prevent the color from sticking through the fabric, yet keep the latter from becoming brittle. If one coat of color will not make the design or letter smooth, apply another, and when thoroughly dry, put on your oil gold size and lay your leaf in the usual manner. To make a good job, you must go over the first layer of leaf with a second one and burnish the gold with a wad of cotton.

—843—

Blue Enameled or Porcelain Signs.

How blue enameled or porcelain signs are made.

This process is true enameling, and the Frechmen call it Emaux, the Germans Schmelzguss. The bases of all this work are highly transparent and

fusible glass, which receives its color from the addition of metallic oxide, such as lead and tin for white calcined (protoxide of) iron for black, cobalt for blue, black oxide of copper and red oxide of iron for green, and so on. Flint or flint glass is fused with the oxides, and the resulting product is called flux. For instance, to make a flux for general use, to be colored to suit, mix 16 parts by weight of red lead, 3 parts calcined borax, 12 parts powdered flint glass, 4 parts powdered flint, fuse in a Hessian crucible for 12 hours, then pour it out of the crucible into cold water and reduce to powder in a biscuitware mortar. The fusing is rendered more easy by increasing the quantity of flux, such as glass, flint or sand.

The powdered flux referred to in the above is ground in water to a fine paste with the required metallic oxide added and one-eighth of its weight of potter's clay, and with this paste line the pickled iron to the depth of one-sixth of an inch and let it stand in a warm room until partially dry. Then have a dry powder ready, which has been mixed from white glass free from lead or arsenic 125 parts by weight, 25 parts powdered borax and 20 parts anhydrous carbonate of soda. To 45 parts of this mixture add one part soda. With this dust the still moist layer on the iron and dry it in an oven at 212 deg. F. Then put it in a muffle and increase the heat gradually until the glaze fuses, when the article is taken out, more of the glaze dusted on, given a second heating, then allowed to cool slowly. We do not know of any practical book on this work that we could recommend.

—844—

Gold Size for Lettering on Wood or Metal.

For a slow oil gold size for outside gilding there is nothing better than what is known to the trade as fat oil gold size. To prepare this mix equal parts of best coach japan and fresh pure boiled oil (kettle boiled, not the present bung-hole boiled or kettle mixed oil), and color it with a little chrome yellow, then add as much fat oil with this and you will have a twenty-four hour gold size which you can make set up still more slowly by adding more coach japan. The fat oil you can prepare by placing pure raw linseed oil in a clear glass bottle, leaving it uncorked standing on a window sill, where the sun has daily access to it, so that it may bleach the oil, while it will oxidize from the air. There is nothing to compare with fat oil size for exterior gilding in point of wear and durability.

A medium size can be made by adding a tablespoonful of coach japan to one quarter pint of coach finishing varnish, cutting it with a few drops of turpentine to make it flow freely from the pencil.

When a quick size is required for small work, that must be hurried, the best thing is to take japan gold size, tempered with say one teaspoonful of boiled oil to one gill of the japan gold size, adding a little chrome yellow to color it.

For work that is not submitted to severe exposure and especially for hard, smooth surfaces, a quick size is best, because slow size in drying is apt to break away from the edges, causing them to be ragged. Make the size fresh for each job and thin enough to flow freely by adding a little turpentine.

—345—

Backing Up Gold Leaf Letters on Glass.

For backing up gold leaf letters on glass, so as to make them wear for a very long time, we suggest using two coats of color and one coat of varnish as follows:—For first coat mix dry lampblack, that is free from grease or unburnt matter, with quick rubbing varnish to a soft paste and add just enough turps to make it flow evenly from the brush. If lampblack is objectionable take white lead and dry lampblack to produce a lead color, mixing with equal parts coach japan and rubbing varnish to a paste, thinning with turps for the brush. This first coat should dry very nearly flat. For the next coat, take oil color and thin

with rubbing varnish, so as to have it dry with an eggshell gloss. Make sure that every coat is dry and hard before applying another, or it may break the glass if of large size. Let the last coat of color stand at least forty-eight hours before applying the varnish, and be sure to go over the color with a dampened chamois before varnishing.

—846—

Preparing Glass to Draw or Write On.

There are several ways by which this can be accomplished. It is necessary that the glass must have a certain degree of roughness in order to make the drawing or writing take. Ground or etched glass would be the proper kind to use, but if you do not wish to go to that expense you can make a matt varnish for the purpose by dissolving 60 grammes of gum sandarac and 20 grammes gum mastic in two ounces of ether, adding one ounce of benzol. This varnish is applied to the glass after it has been wiped clean with fine tissue paper, and in order to have it uniformly distributed over the surface the glass may be laid horizontally on a warm plate. For writing or drawing on glass it is best to use India ink with a little sugar added. To render the glass again transparent, after writing or drawing upon it, apply a coating of a sugar solution with a soft hair brush.

Another way is to make the glass panes or plates hot and apply a thin syrup of equal parts of white and brown sugar, to which a small portion of alcohol has been added. The film dries rapidly and makes an excellent matt surface for the purpose. The drawing can be made permanent by finishing with mastic varnish.

—847—

Painting Smalted Signs.

If the sign is a new one it should be well primed with lead color and then given a few coats of the color in which the letters are to remain. Then pounce in the outlines of your letters and cut in with a paint of the color of the smalt you intend to use, black for black smalt, blue for blue smalt, green for green smalt, etc.

The color or paint to be used to cut in around the letters and which is to hold the smalt should be thinned with good flowing boiled oil and held fairly stout. The smalt is sprinkled on through a sieve in order to keep foreign matters out of the smalted surface, and if the smalt is rather coarse, it must be left on the surface longer, so as to obtain a grip on the oil color. When set, stand the sign on edge to remove excess of smalt.

—848—

Lettering a Brass Sign in Black.

To refill the letters in an old brass sign, cut out the old filling without defacing or scratching the surface and heat the plate. Pulverize equal parts of gum asphaltum, gum shellac and lampblack and melt it into the letters, or simpler still, melt in black sealing wax. Use a hot flatiron to even up the surface and scrape off surplus from the plate. Then hold the warm flatiron over the filling to make it glossy. When dry and hard, polish all of the surface with rotten stone or tripoli and sweet oil. Another way to accomplish relettering without heat is to clean both the face of the sign and the cavities made by the letters or figures carefully from the old filling and fill these again with a stiff putty made from black filler and lampblack mixed with equal parts coach japan and rubbing varnish, which is pressed in by means of a flexible spatula that is kept wet with turpentine. The putty is allowed to extend very slightly over the level of the surface of the sign and when it has become hard, leveled down with pumice and water. This done, the whole surface is polished with rotten stone and sweet oil.

—849—

Ink That Will Not Spread on Show Cards.

The following has been used by some show card writers, who claim to have had excellent results in drawing very broad as well as the finest lines with sharp outlines:—

Melt four ounces shredded, clean white wax and one and one-half ounces white soap by heat, and when well amalgamated add one-half ounce of lamp-black. Mix well, heat strongly and add one ounce of gum shellac. Heat again, mix well, let cool and bottle for use. Use a wide-mouth jar and cork tightly.

—850—

Ink for Writing on Glass That Will Stand Water.

Melt together 10 parts, by weight, of white lac (bleached shellac) and 5 parts true Venice turpentine and thin with 15 parts spirits of turpentine and add 5 parts finely powdered indigo. Use a soft pen or a fine camel's hair pencil of suitable size. Water will not remove the writing.

—851—

The Mahl Stick and Its Use.

This stick or rest is a small round stick of hard wood, made smooth by turning in a lathe, finished with sandpaper. Usually one yard in length, it tapers down from three-fourths of an inch to three-eighths in diameter, and on the small end a piece of velvet cloth filled with cotton is fastened. It is used by artists in painting pictures on canvas that rests on an easel, and very frequently by sign writers when lettering large and medium-sized signs where they cannot rest their right hand on their left, as is usually the case on small work. Experts claim that by using mahl sticks cleaner work can be done and a better rest is had than when the left hand is used as a rest. Our advice to the beginner is that if you learn to letter or stripe without its use do not afterwards use the mahl stick, as that would mean learning over again.

GILDING.

—852—

Gilding on Glass and Other Surfaces.

The chief requisites for gilding of any kind is good gold leaf and well-known brands only should be selected. The next thing is to have the proper size and a good clean surface to work upon. The tools required are a pair of sharp shears or a good sharp penknife, a gold-leaf cushion, 4-inch spatula, a brush made from pasteboard and camel's hair about 3 inches wide, called a gilder's tip, and a piece of silk or other soft cloth for burnishing. A camel's hair spalter is also useful when gilding on glass. The size for gilding on glass can be made in several ways, first by dissolving one-quarter ounce gum arabic in one part of boiling water, soft water being best, filtering through blotting or filter paper, and adding, when cold, one tablespoonful of pure white whiskey or spirits of wine. Should be permitted to stand a day before using, but will work better if it stands a week in a well-corked bottle. Another and stronger size for gilding on glass is made by boiling one ounce best isinglass or gelatine glue in a little hot water, say about one-half pint. Add this to one pint of alcohol and enough water to make three pints in all. Strain the mixture through filter paper and test on glass before using. If not strong enough, add more isinglass and strain again. Clean the glass thoroughly with whiting and then rub over with alcohol, and polish with tissue paper. Apply the size with a clean camel's hair spalter to the portion where the leaf is to be laid. With the gilder's tip throw on the gold leaf and let it dry. When dry rub it briskly with a wad of refined cotton until the desired luster is attained. If much of the gold has been rubbed away, it does not matter, so long as the luster is there; put on a second layer same as first, using the same size. When this is dry, go over it again with cotton, but lightly this time. Back up the gold with good copal varnish, unless a design is to go upon it. Silver or aluminum leaf is laid in the same way. To gild on wood or iron, a good ground should first be had by applying several coats of paint, the last coat to dry flat and to be rubbed smooth. The design should be marked off with chalk, the use of lead pencil is to be avoided. If the work is done outside, patent gold leaf should be used, which is prepared for that purpose. On interior work ordinary gold leaf will answer. Oil gold size for this method of gilding is best prepared from old, fatty linseed oil, to which is added a very little japan and orange chrome yellow, the whole thinned with turps to flowing consistency. If fatty oil cannot be had, varnish maker's boiled oil will answer. This size should be still tacky ten hours after application, when it is ready to receive the gold. The leaf is cut to the proper widths for the job in hand and the gold laid with the gilder's tip, which is first rubbed over the hair of the head to generate enough electricity to pick up the gold. When dry, burnish the gold with silk or soft cloth.

—853—

Gold Size Japan and Japan Driers.

How is gold size for mixing with paint made and what is the difference between gold size and japan and japan drier?

There is oil gold size and japan gold size for gilding, the latter being used when the work must be done quickly. We take it that you, however, refer to gold size japan, which differs from coach japan only in so far that it is much paler in color and not quite so strong a drier. Like coach japan, it is made, or at least should be made, by melting and fusing hard gum or fossil resins with such drying salts as litharge and oxide or borate of manganese and linseed oil and reduced to flowing consistency with pure spirits of turpentine. Its color should be a golden yellow or at least not darker in the body than light brown, while coach japans run from light to a very dark brown, sometimes nearly black when

looked at in a mass. Japan driers or brown japans, as made for and used by the house painter, are prepared in a similar manner but less gum and softer gums are used, and they are made of thinner consistency, less oil being introduced and naphtha is substituted, at least in part, for the turpentine.

—854—

Gold Leaf for Outside Gilding and Protection of Same.

The best gold leaf for exterior work is now so prepared that a blow of air will not make it necessary for the gilder to grease the leaf, as used to be the case in bygone days. Pure gold leaf does not need any protection from the weather, as it will stand exposure under any condition far better than any varnish that can be made. Varnish would only tend to dull the effect and perish in a few years or lesser time.

—855—

To Try Gold Leaf for Purity.

Pour a few drops of aqua-fortis upon a clean piece of glass and lay a piece of the gold leaf so that one part of it rests on the aqua-fortis and part on the dry glass and by holding the glass against the light it can be seen whether the gold has been attacked or partly decomposed by the aqua-fortis. Pure gold will resist the acid, while all alloys will resolve.

—856—

Recovering Waste Gold Leaf from Gilding.

What is the method used by bookbinders in saving the surplus gold. I believe they have soft rubber resembling putty, with which they pick up the waste leaf, and which rubber is afterwards burned by some process and the gold recovered. What kind of rubber is used? And by what process is the gold recovered? I am informed that publishing houses save a large amount of gold in this way.

The soft rubber balls which are used by many book finishers for picking up surplus gold leaf may be obtained from any of the bookbinders' supply houses, and to recover the gold from these rubber balls it is necessary to place them in an iron pot and with moderate heat burn the rubber from the gold. The best plan, however, is to send the balls when they are filled so that they will pick up no more gold to a reliable gold beater or some large jewelry manufacturing firm, who will extract the gold from the rubber at reasonable charge or give due credit for the gold recovered. With one of those balls from fifteen to twenty dollars worth of gold can be picked up before it is exhausted. These rubber balls may be produced by obtaining three ounces of the very purest rubber, sold at retail at 50 to 60 cents per ounce, an inferior quality will not answer, and cutting the rubber into very small shreds with a sharp knife that is constantly dipped into water. These shreds are placed in a can or dish and covered with pure spirits of turpentine, then tightly covered to prevent evaporation and permitted to stand 24 hours, when the softened rubber is removed from the can and kneaded with the hands like dough for several hours, until it no longer sticks much to the hands but works pretty much like glazier's putty. This latter process is troublesome, but it is said to be superior to the purchased rubber balls.

—857—

Retarding the Drying of Gold Size.

To show up gold size that sets too fast, always use pure boiled linseed oil, as raw oil is liable to make the size curdle.

—858—

Gilding on Glass—Best Size for Laying Leaf.

Glass signs had been noticed on which the gilt looks like polished gold. The inquirer wanted to know how this is done and what is the best size for laying leaf on glass; also how it is burnished; also desires to know how to make gold leaf adhere when apt to peel off from the sweating of the glass.

The brilliant effect of the gilt on the glass signs in question is produced by several layers of leaf and the burnishing process. The best size for laying leaf on glass is made from Russian isinglass or gelatine. Take a piece about the size of a silver half-dollar and dissolve it in one-half pint of filtered water in a clean porcelain dish. Be careful to skim off any scum that may rise to the surface and allow the size to cool. Apply it with a two or three-inch flat camel's hair brush to the glass, previously well cleaned, and lay on the gold leaf as required, but do not touch the glass or size with the gilder's brush. After the first layer of leaf is laid smooth it down with a tuft of cotton, size again, lay another course of leaf, then burnish briskly with a ball of cotton and finish by backing up. To have the gold brilliant, do not drown the leaf in the size. If properly backed the leaf will not peel off from the sweating of the glass.

—859—

Backing Up Gold Leaf.

How would you mix color for backing up gold leaf so that it will work freely, have staying qualities and may be varnished over with good results?

For the first coat we should mix dry lampblack that is free from grease with quick rubbing varnish to a soft paste and thin with only enough turpentine to make it work free and even. If black is objectionable, we should take red lead and enough dry lampblack to make a light lead color, mixing this also with quick rubbing varnish and a trifle of coach japan, using only enough turpentine to make it work freely. For the next coat or coats mix your oil color with rubbing varnish, so as to produce not more than eggshell gloss. Be sure that every coat is hard before applying another, or the glass, if a large one, may break. Permit the last coat to stand at least 48 hours before varnishing over and use the very best quality of varnish.

Referring to this heading, Thomas J. Goyette, a Lowell, Mass., sign painter, writes:—"Your information is very good, only you may add to it to wash the painting with a damp chamois before varnishing the last coat. This is very simple but effective."

—860—

Backing of Gilding on Glass Coming Off in Frosty Weather.

How can gold lettering on glass be kept from coming off in frosty weather? A quite expensive sign on a store front caused no end of trouble. The space where the lettering is on had been backed up with imitation of carmine in japan, mixed with turpentine and a little rubbing varnish, the whole coated with a good carriage varnish overlapping the outlines one-quarter inch into the clear glass, but it comes off first next to the sash, which is wood?

It is a difficult matter to retain any backing on store windows in a long continued frosty season, and it is no easy matter either to explain where your method has failed of good and lasting results. It is just possible that your backing of carmine, being ground in japan, thinned with turps and a little rubbing varnish, did not have enough binder for adhesion in frosty weather. The fact that you placed a coat of coach varnish over all is not sufficient guarantee that it would not permit moisture to get beneath it. We think that if the carmine had been ground in varnish and mixed with a first-class slow drying, elastic varnish and very little turpentine it would have withstood frost and moisture far better, even without a final coat of varnish.

—861—

Size for Laying Gold Leaf on Water Color.

A size for laying gold leaf on water color was wanted.

For burnished gold size or gold size for distemper gilding, dissolve either parchment or isinglass in water, to which yellow ocher that has been ground very fine in water is added. The parchment or isinglass is dissolved the same as for glass gilding, but the size is made stronger. A trial will give the proper proportions.

—862—

Cleaning Gilded Picture Frames.

Moisten a sponge in either soap and water, spirits of wine, turpentine, or old ale, and just rub it over the gilded frame to moisten the fly specks, dirt, etc., and then very lightly draw the sponge over the gold, but not using force or the gold will also be rubbed off. When dry, give a coat of thin weak water size, made by dissolving a piece of common size as big as a walnut in half a pint of hot water, and sprinkling this over the gold very gently with a brush called a dabber.

Another detergent fluid for removing smoke, dirt, etc., from gilded frames, is to dissolve half an ounce of salts of tartar in one pint of water, and apply this with a sponge to the gilded frame, then stand the frame upright so that all water will flow off it and syringe the frame with clean cold water; afterward size it as above described.

H. C. Standage.

The best way to clean fly specks and other disfigurations from gilt picture frames was wanted.

There are various ways to accomplish this. If there are no other but fly specks to be removed a washing of the frames with old ale is simplest and most effective. If the frames be smooth moisten a soft cloth with the ale and rub it lightly over the frame until nearly dry and do not use any water. For carved work a soft brush is used for the application of the old ale. By not wiping off or rinsing with water a thin coating of the glutinous substance in the ale is left on the surface, which imparts a certain degree of luster to the gilt and prevents following fly specks from fastening to the frame, as would otherwise be the case. Another way to remove dirt spots and fly specks from gilt frames is to moisten a sponge with hot alcohol or hot spirits of turpentine, rubbing the frames over with the sponge to remove the spots and specks, leaving the surface to dry without wiping.

When gilt frames, however, require touching up after cleaning in the manner described, that is, where the spots are as deep as the gilding itself, another treatment is required. The best means in this case is to select some gold bronze which comes nearest in color to the gilt on the frame. The gold bronze is first given a repeating washing in clean water until the latter pours off perfectly clear. Then the bronze is mixed with a solution of gum arabic and applied with a fine hair brush to the discolored spot. If when the first coat has dried, the discoloration is still apparent, give another coat and so on until the spot has disappeared. To make the touched up spots impervious to moisture rub the bristles of a brush over a piece of yellow beeswax until they feel tacky and go lightly over the touched up spots.

—863—

Gilding Copper and Galvanized Iron Exposed to the Weather.

A painter in Baltimore had the job of gilding several large ornaments, some of copper, some of galvanized iron, on the roof of a tall building, and wanted to know how the metals should be treated in order to make the job a lasting one, in other words, to keep the gold leaf from peeling.

Dissolve 2 ounces of sulphate of copper (blue vitriol) in one pint of water and

get your druggist to add enough nitric acid to the solution to slightly acidulate it; 10 to 15 drops will be sufficient. With the solution wash the copper article all over and let it remain about one hour, until it has assumed a dark, nearly black color, then rinse with clear water and dry with a cloth. Then apply your ground for the gold and this dry, apply your size and at the proper time proceed with the laying of your leaf, as you would on any outside job. For the galvanized iron articles make a solution as follows:—One-half ounce of copper chloride, one-half ounce copper nitrate, one-half ounce sal ammoniac are placed in one quart of water in a glass bottle, and when dissolved, one-half ounce of hydrochloric acid is added. Apply this solution with a soft brush to the articles, upon which first a black then a gray film will form. After 24 hours run the duster lightly over the surface to brush off the surplus dust, then apply your ground color same as in the case of the copper and go ahead with your gilding, which will remain permanently.

—864—

Gilding on Granite and Other Stone.

First apply one coat of size to the spot or place to be gilded, then mix the size with a little fine powdered chalk or whiting. Let each coat dry hard and rub down with fine glass-paper before the next is applied. This will give the necessary filling. Now apply gold size thinly and evenly, and when still tacky put on your gold leaf in the usual way. Oil gold size should be used for laying the leaf.

—865—

Cleaning Articles Gilded with Gold Leaf.

How can gold leaf letters on signs and gilt frames that have been laid with leaf be cleansed? Also other objects laid in gold leaf?

Make a solution of $1\frac{3}{4}$ pounds bicarbonate of soda, $1\frac{3}{4}$ pounds chloride of lime and $\frac{1}{2}$ pound common salt in 3 quarts distilled or filtered rain water and keep this in a well stoppered glass bottle. If you do not require so much reduce these figures proportionately. If the articles are small and gilded all over immerse them in the solution for about 10 or 15 minutes, take out and dry, then wipe over with spirits of wine and dry with fine sawdust. If the dirt is very obstinate heat the solution, but not to the boiling point, say about 120 deg. F. will be ample. To clean letters on signs or gilded frames apply the solution with a sponge and rub lightly, repeating the operation until successful, wring out sponge, mop up and go over it with spirit of wine, which will dry out of its own accord or may be burnished with a piece of old silk. Stains on gold or gold leaf may be removed with a solution of one-half ounce of cyanide of potassium in one pint of rain water. The solution should be permitted to remain on the stains and then brushed off with prepared chalk.

—866—

Imitating Gold with Aluminum Leaf.

In order to counteract the white paint effect of the aluminum stripe witnessed upon the equipment of some roads, the decorations may be coated with gold lacquer prior to being varnished. This effect is not entirely deceptive, but it is declared to be an imitation of gold, sufficiently smart in looks to be very effective.

—867—

Gilding Letters Cut in Soft Stone.

Stop the suction in that part of the letter that is to be gilded with one or two applications of shellac varnish; then give one good coat of oil color, preferably

chrome yellow. If there is any danger of the oil color running out over the shel-laced surface, give the sides a coat of the white of egg or glue size, which may be washed off when the gilding is finished. Use fat oil gold size for laying your leaf and do not begin gilding until the size has set so well that it will not become dead or wipe off when the finger is passed over it lightly, otherwise the gold leaf will be drowned and without luster.

—868—

Matt Gold in Glass Gilding, with Burnished Outlines.

Lay the leaf which is to form the matt gold center in the ordinary way in varnish size, and you will find that on the opposite side, in contrast with the burnished gold, it will appear decidedly dead or flat. The outlines that are to be burnished are laid in isinglass or gum arabic sizes, which is applied with a clean camel's hair spalter, the leaf laid on, the glass set up edgewise, and when dry rubbed over lightly; then washed repeatedly with sizing to secure a spotless surface. Now it is ready for the design, if such is desired.

—869—

Tools Required for Gilding and How to Burnish Gold Leaf.

The tools required for gilding on glass, wood or iron are very few in number. A camel's hair spalter for applying the size to glass and a sable hair pencil or brush for wood or iron, especially heavy sign work. A so-called gold knife with long, slender blade for cutting the gold leaf books, a "tip" for lifting the leaf, made of two pieces of paste board, between which a small quantity of camel's hair is laid and glued together; a cushion made by laying a piece of cotton on one side of an oblong piece of wood, 6 by 8 inches, over which is tightly stretched a piece of chamois skin, to lay on the leaf. A good, soft duster, a piece of crayon chalk, a tracing wheel, a pouncing bag, some refined white cotton and the necessary pencils and brushes for shading and backing up, complete the outfit. The burnishing is done with the cotton.

We would recommend the "Gilder's Manual" as a book of reference.

—870—

Gilding on Store Windows in Winter.

Use the same kind of size for laying your leaf as you do in warm weather, but see that your glass is first thoroughly rubbed with a solution of one ounce each of nitric acid and acetic acid in one-half pint of water, and then cleaned in the ordinary way with soft water and whiting, and when the whiting is dry, polish with chamois skin. When the gilding is finished and backed up in the usual manner and the work has dried hard, go over the whole with elastic varnish, running a little over the edge of the letters on the glass, which will keep the frost from peeling up the gold. To test drying, take a scrap of glass and try your size; if too heavy, the gold will appear spotted; when burnished with cotton, if too weak, the gold will rub off under the same treatment.

—871—

Gilding on Glass—How to Do It Properly.

It is an easy matter for us to tell others how the work should be done, but a more difficult matter for others to do it without a good deal of practice. However, we shall endeavor to explain to you the method by which others do the work successfully.

Your attention is first called to the proper preparation of your size, which may consist of a solution of gum arabic, isinglass or white sneet glue. For the

gum arabic solution dissolve one-eighth of an ounce of gum arabic in one pint of boiling water, filter through blotting paper or regular filtering paper, and when cold add a teaspoonful of pure white whisky to keep from molding, and when placed in a bottle well corked it will keep for many months.

A still better size, but more troublesome to prepare, is that made from isinglass. Take a piece of isinglass the size of a nickel and dissolve it in a pint of boiling hot rainwater, which must be heated in a perfectly clean pan to avoid grease. If any scum arises during the boiling or dissolving process, remove it with a spoon. Filter the solution through white blotting paper while hot and allow to cool, when a tablespoonful of alcohol may be added to take out any traces of grease that may still be there. This will also keep for a long time if kept in a well corked bottle. While we consider this the best size for glass gilding, would say that if isinglass is not handy a piece of clear white sheet glue, about the size of a silver dime, may be taken in place of the isinglass and treated in an exactly similar manner. The principal point about the size is to have it free from grease and to allow it to stand for at least twenty-four hours before using.

Next important is to see that the glass is pure, for on inferior glass good work cannot be done. If the glass be greasy, wash it with a solution of one ounce each of nitric acid and acetic acid to one-half pint of soft water. Allow this to remain on the surface about five minutes, then clean the glass with soft water and whiting, and polish the side on which you intend to work with tissue paper. Now lay your punctured design on the opposite side from that on which you intend to work and apply the size freely with a camel's hair brush or spalter, and with a tip lay on the leaf as smoothly as possible, allowing it to protrude over the edges of the design and permit the whole to dry, then burnish with raw cotton. Rub briskly to obtain good luster, no matter if some of the gold rubs off, then apply your size for the second layer of gold, but not as plentifully as at first, and lay on the leaf as before. When dry, burnish again and then go over the work to patch up wherever there is only one coat of gold, by dampening such patches with the edge of the brush and laying on small pieces of the leaf, and this dry burnish lightly. If a spotless surface is desired, wash it several times with the size. When dry, it is ready for the design, which is now laid right side next to the gold and the outline of the letters pounced on with a pouncing bag filled with whiting or Venetian red. The backing up may be done with asphaltum varnish or rubbing varnish mixed with lampblack and thinned with turpentine, the latter being most permanent. When the backing is perfectly dry, dampen a small bit of cotton and rub off the surplus gold, then shade your letters backward, laying on the darker shades first, then the lighter ones and the background last. Before beginning to work, test your size on a scrap of glass; if your size is too strong, the gold leaf will appear spotted; if too weak it will rub off too easily when burnishing.

To keep gilding on glass from early destruction by frost or repeated scrubbing, go over the whole with a good elastic varnish.

—872—

Best Size for Gilding on Glass.

The best size for gilding on glass is, without exception, fish glue dissolved in rain water. To find out whether it will be just right for burnishing the leaf is to try the size on the hand and have it so thin that it has only slight adhesive power, because if too much isinglass is used the leaf does not burnish well. A prominent sign writer uses a size made by dissolving isinglass in white wine vinegar, filtering the size before using. Some decorators in Europe prepare a size by macerating the seeds of quince in white whisky or brandy until the resulting liquid attains proper cohesion, then filter it. This is said to be the best size for gloss gilding on glass, but, of course, the most expensive one also.

—873—

Gilding on Glass—Size for Laying the Leaf.

It is best to use the pure gold leaf for gilding on glass; otherwise gold bronze powder might as well be employed. The isinglass size is best for gilding on glass, be the work smooth or embossed. We have never known any quick varnish size to hold gold leaf on glass for more than one of two seasons, no matter how well the work was backed up, while pure leaf laid in isinglass size double we have known to have remained on exposed show windows for ten to fifteen years. Much, of course, depends on the backing, and too much scrubbing of the signs will destroy the backing in due time.

—874—

Best Backing for Gold Leaf on Glass.

Genuine asphaltum in oil, such as is sold in tubes for artists' use, is the very best material for backing up gold leaf on glass signs. The commercial asphaltum varnish will not answer. If the former cannot be readily obtained, mix lampblack, ground in japan with a high grade outside or coach varnish, first cutting the lampblack with some turpentine.

—875—

Glazing Aluminum Leaf to Obtain a Golden Effect.

Raw sienna is not transparent enough for a glaze on leaf, and Dutch pink is out of the question altogether. Procure some high grade French yellow lake, ground in varnish, and thin same as you would French carmine for glazing with as little turpentine and as much pale coach varnish as possible, and you will get the desired effect.

We recommend French yellow lake especially, because we know it to be more permanent and safer than gamboge, turmeric or dragon's blood, although a mixture of the last two would give a richer effect in the outset.

—876—

Gilding on Brass and Copper.

The following formula is given by the Scientific American for water gilding brass or copper: Convert $6\frac{1}{4}$ pennyweight of fine gold into chloride and dissolve this in one quart distilled water, then add one pound bicarbonate of potassium and boil the mixture for two hours. Insert the articles to be gilded into the warm solution for a few seconds up to one minute, according to the activity of the bath. We presume, however, that the cross you wish to gild is too large to place in a bath such as here described, but should think that the solution could be applied as a wash with the brush, and that, if repeated several times, would serve the purpose.

—877—

Burnishing Gilding and Burnishing Size.

To burnish gilding successfully a good deal of experience is required. The burnishers use either flint or agate, preferably flint, and for different work they should be of different forms. When the burnishing is done, those parts that have not been burnished must be weak sized, that is, they are wetted with water in which just a trifle of clear size has been melted, which helps to secure the gold. When dry the gold is wiped with a piece of soft cotton wool to remove rough or ragged edges of gold, and if any defects are now shown in the gilt these must be corrected by cutting up a leaf in small shreds, laying them on the defective places previously wetted with a camel's hair pencil.

Burnishing size consists of such ingredients as pipe clay, red chalk, flake graphite, suet and bullock's blood, and can be purchased from supply houses in the larger cities.

—878—

Best Method of Laying Patent Gold Leaf on Wooden Surfaces.

Patent gold leaf is used exactly in the same manner as the regular leaf. It is only prepared so as to save the leaf when the gilding is done outdoors, and awnings need not be erected to keep the leaf from blowing away. It is so put on that the adhesion to the size is greater than to the leaf of paper, and so comes off onto the work as desired. In laying the leaf use the ordinary size and proceed in the usual way.

—879—

Gilding a Dome With Gold Leaf—Best Size and Method of Laying the Leaf.

You should have stated what the dome to be gilded consists of, whether it is made of wood or metal, and if the latter, what does the metal consist of; in other words, is it iron, tin, copper or brass? To take the leaf well, the surface should be primed and the priming depends very much on the character of the material. If the surface of the dome is wood, apply several coats of paint, until a perfectly smooth surface is had, but let the last coat be flat, so that it may be sandpapered and that the size may hold well without crawling or wrinkling. For metal of any kind, cleanse well, then apply several coats of flat paint, rubbing down the last coat to a smooth finish with hair and pumice. Then apply fat oil gold size and when this has set up sufficiently, lay your leaf in the usual manner, but, to avoid loss from blowing away, use the patent gold leaf, now prepared for that purpose, which will save you the trouble of greasing the leaf, which had to be done by the painters of "ye olden" times. Lay your leaf from the book and burnish with a cotton wad. You can prepare your fat oil gold size by using the oldest linseed oil you can find, mixing it with a trifle of medium chrome yellow that has been ground fine in oil, and if you wish to hasten its becoming tacky, add a tablespoonful of gold size japan to one-half pint of the oil. Good elastic gold size that will remain elastic for a century may be made by boiling one quart of raw linseed oil with one-half ounce of soda until the oil thickens into a soft soap-like consistency under constant stirring.

When nearly cool, it is mixed with a similar quantity of raw linseed oil well aged and thinned with enough turpentine to make it flow nicely from brush or pencil. A trifle of chrome yellow is added for gold size, or a little white lead tinted with lampblack for aluminum leaf size.

—880—

Preventing the Rubbing Up of Outlines in Gilding on Glass.

We have always understood that for gilding on glass there is no better size than that made from the genuine Russian isinglass. It is best prepared by dissolving one ounce of the isinglass in, say, one-half pint of boiling water, which should be done in an enameled dish or pan. Add to this one pint of alcohol and enough water to make three pints in all. Strain this mixture through filter paper to remove all possible traces of grease and test on glass for strength and adhesion. If not strong enough, dissolve more of the isinglass in the same manner as at first and add it to the former mixture without adding more alcohol and water. Have the glass thoroughly clean and put in the outlines of your design with wax pencil or wax crayon. Lay on the size with a clean camel's hair spelter and throw on your leaf with the gilder's tip and let it dry. When dry rub it

briskly with a cotton wad until you have good luster. If some of the gold has been rubbed away it does not matter so long as the luster is there; put on another coat of size and another layer of the leaf. When this has dried go over it again with the cotton wad, but only lightly this time and be especially careful not to bear too hard on the outlines. Back up the gold with a good copal varnish, unless a design is to go upon it.

—881—

Painting and Gilding a Barber's Pole.

How a barber's pole should be treated when gold leaf is used:—

Apply colors to the pole so that they will dry flat or at least not higher than eggshell gloss. When you have a sufficient number of coats of paint on to cover well lay your leaf in ordinary oil gold size and use the Hastings XX Patent Gold Leaf, as the pole will have to stand exposure. The leaf really does not need to be protected, as pure gold leaf should not tarnish. But the colors require to be varnished over and it is well to let the varnish go over leaf and all. Use the best pale spar varnish you can obtain.

—882—

Preventing Gold Leaf Adhering to Varnished Surface.

Best way to prevent gold leaf from sticking to hardwood that has been finished and rubbed with crude oil and No. 0 pumice stone. The oil has been cleaned off with cheese cloth and the varnish is dry and hard, yet the gold leaf sticks outside of the oil gold size.

To prevent gold leaf adhering to polished work as you describe it we would suggest that powdered chalk dusted on the outside of the space to be gilded will prevent the leaf from sticking and the chalk can be removed when the gilding is completed. But the space should have been rubbed with a silken cloth before dusting on the chalk, as cheese cloth is not fine enough to remove the crude oil effectively. The only other method that we know of is to pick up the surplus gold with rubber balls, such as are used by bookbinders, and can be procured from any bookbinders' supply house.

—883—

Solution for Keeping Glass from Sweating During Gilding Process.

Alcohol is the only means we know of to keep glass from sweating for the length of time you speak of. But a simple going over the glass with a cloth moistened with the spirit will not suffice. If a sponge is saturated with grain alcohol and the glass liberally touched with the sponge all over without wiping off and permitting the spirit to evaporate, it is said that the glass will not sweat inside of eight or ten hours, even in frosty weather, so long as there is fair ventilation in the room. This will not, however, apply where there is a gas radiator or stove in close proximity to the glass. Previous to the sponging of the glass with the alcohol it must be thoroughly cleaned and wiped dry.

—884—

Burnish Gilding.

Sample sent to us of a small piece of compo scroll work that has been gilded, part of a large job he has to do, and instructions asked for finishing the work to have a similar luster. Some of the job was done seven years ago with fat oil gold size and gold leaf and it "looks like bronze alongside of this sample."

Unless gold leaf is protected by a lacquer it will tarnish, owing to the amount of baser metal added to it to facilitate the beating process. Molding is specially prepared and gilded, and the operation involves considerable work.

When the natural wood is to be gilded, the surface must first be sized with glue size, on which fat oil size may be laid, and on this the gilding is done. Very soft or porous wood should first be shellaced, omitting the glue size. This method applies to carved work, moldings, etc. By this process, the natural grain of the wood shows. If this is not desired, then the surface must be prepared according to kind of finish desired. There are three finishes, or methods, namely, oil gilding, matt gilding and burnish gilding. Our correspondent is interested in burnish gilding only. The sample that he sends is done that way. Molding may be bought ready bodied up for the gilding. This saves much time, and, of course, is better than if done by the inexpert. But we will briefly describe the "bodying up" process as it will likely be useful to others, as well as to the present questioner. First of all, the bare wood is coated with a size of gelatine and whiting, made thin and applied hot. Only one coat is required. Use a weak size. Then fill all holes or cracks with a putty made with whiting and some size. When all is dry, make smooth with steel wool or very fine sandpaper. Dust off. Next apply several coats of whiting and glue, like cream in consistency, applied hot, allowing each coat to become dry before applying the next. After the last coat is dry, make smooth. The expert now takes a wet rag and deftly passes over the surface of the work, which makes it smoother, but this must be done with care, so as not to remove any coating from the edges, etc. Use a soft hair brush for applying the white coatings. At this point, the wood will have considerable thickness of white body, about the sixteenth of an inch. Now we are ready for the burnish size. The size is made from pipe clay, six parts; black lead, two parts, and finely scraped mutton suet, two parts; all ground or worked to a paste. This is mixed with weak, hot gelatine size, being about like cream while hot, or like common table jelly when cold. If too strong, it will not take the burnish so well. Several coats of this are applied, say five, and after each coat is dry, rub smooth with fine steel wool or very fine paper. When all is dry and done, wet the work with clear cold water, a little at a time, and lay the leaf on a flowing coat of water.

The addition of black lead or graphite is to make the burnish easier and better.

The burnish must follow at once, after the gilding is dry, or before the size becomes hard dry. Otherwise, you will have trouble in getting the burnish finish. The first work in burnishing consists in gently rubbing the gold with cotton wool, something like oil gilding, then, with the burnishing tool, gently rub the gilding, a very little space at a time, until the desired burnish is obtained. The burnishing tool is made from agate, and may be bought from any painters' supply store.

If the molding is in position, and only needs regilding, then all that will be required will be the cleaning off and sandpapering of same, and the clay-graphite-suet size.

—885—

To Make Aluminum Leaf Appear Like Gold.

This can be done with a spirit varnish that has been colored with turmeric and dragon's blood. Dissolve by digestion gum sandarac alone or equal parts of this and bleached shellac in alcohol, adding the coloring matter, 12 ounces of sandarac or 6 ounces each of gum sandarac and bleached shellac, 1 ounce of turmeric and 2 ounces of dragon's blood to one gallon alcohol. When dissolved, filter through cloth.

—886—

Size for Imitation Gold Leaf on Tin Foil.

Take animal gelatine dissolved in water, using that which comes in sheets and is also known as animal jelly, obtained from animal tissue, boiling for a long time in water. Russian isinglass dissolved in filtered water in an enameled or porcelain dish may also do the work. To make the size insoluble for use in exposed

work make a hot, saturated solution of bichromate of potash, that is, put into the hot water as much of the chemicals as it will take up, pour off the clear liquid and add one part of this to one-fourth part of strong solution of the gelatine while both solutions are fairly warm. Stir well and allow to cool. Keep in a well-stoppered bottle, as the mixture will become insoluble when exposed. To use the size for interior gilding it is not necessary to bichromate the gelatine.

—887—

Preparing Fat Oil Size for Laying Gold Leaf.

First thin fat oil to workable condition with spirits of turpentine, but do not use petroleum spirit, the so-called turps. substitute for this purpose. If fat oil is not available, use bodied oil or lithographers' heavy oil instead. Add to this mixture some middle chrome yellow that has been ground fine in linseed oil, also a trifle of English vermilion, until it resembles gold in color as closely as possible. Then thin it to the proper consistency with sufficient turps. and strain through a fine strainer or muslin cloth. Add as much drying japan as you find necessary to make the size dry to suit your purpose or rather to have the proper tack to lay your leaf in. For a large job, which will require some time to do, have your size dry more slowly, in order to hold its tackiness long enough to give uniform adhesion to the leaf. Keep the size in a well stopped bottle for use.

—888—

Quick Drying Size for Aluminum Leaf and Gold Leaf.

A good size on which the leaf can be laid in four hours is made from two measures of gold size japan and one measure of fat oil. For a 12-hour size take one-half pint fat oil and a tablespoonful of gold size japan. For laying gold leaf, add to the clear size a dash of medium chrome yellow in japan. For the aluminum leaf use the size either clear or add a dash of flake white in japan. For inside sign work we would suggest the use of the four-hour size, but for exterior signs, when the work is to wear well and show good burnish or luster, we should prefer the 12-hour size, or still better if time permits, fat oil only.

BRONZES AND BRONZING.

—889—

Quantity of Bronze Powder and Liquid Required for Bronze Paints.

How much liquid or vehicle is required for one pound of aluminum and other bronze powders?

This depends to some extent on the fluidity or viscosity of the vehicle, the lighter bodied liquids requiring more bronze by weight than those of heavier body. A good deal depends also upon the fineness of the bronze powders. A fair average may be given in the following figures:—

One pound aluminum bronze will take one-half gallon.

One pound gold bronze will take one-quarter gallon.

One pound copper bronze will take five-sixteenths gallon.

Aluminum has taken the place of silver bronze, it being less apt to tarnish.

—890—

Aluminum Bronze Powders.

To test the value of aluminum bronze, look for the greatest luster. Place the various samples, side by side, on a piece of glazed paper, and rub each out in streaks over the paper with the tip of your finger. The finest bronze will show best luster and is most valuable.

—891—

Aluminum Bronze Liquids.

A few good formulas for the preparation of bronzing liquid, with which aluminum bronze may be mixed for wet bronzing, were wanted, but liquids containing spirit of banana oil were not desired.

A bronzing liquid that can be used on exterior as well as interior work according to durability of the varnish introduced is prepared as follows:—Place in a suitable vessel four ounces carbonate of magnesia in fine powder and two quarts best coach varnish of pale color, stir thoroughly, then gradually add seven quarts pure spirits of turpentine. This is best done on a water bath, but the varnish and turpentine must not come to a boil. After the mixture has been well warmed and mixed permit it to cool down, and when the magnesia has settled to the bottom decant carefully the clear liquid and stir in your aluminum bronze. The quantity of bronze powder used is optional, but the proportion for good covering is from six to eight ounces to the quart of liquid according to the purity of the bronze. Another liquid, which, however, is for interior work only, may be prepared by mixing and warming on a water bath equal parts of white damar varnish of best grade and pure spirits of turpentine, stirring in the bronze powder while the liquid is warm. One and one-half to two pounds of the dry powder will make a good bronze paint.

For a cheap bronze liquid for scenery painting the following is recommended:—Boil two pounds bleached shellac with one-half gallon of a saturated solution of equal parts of borax and nitrate of soda, until all of the shellac is dissolved, then add enough hot water to make one gallon of liquid. While still on the water bath, stir in one and one-half pounds aluminum bronze and you have a good silver paint.

—892—

Bronzing Radiators and Steam Pipes in Aluminum.

An inquiry was made as to the proper or best method for bronzing new radiators or steam pipes so that they will appear like new metal. Some trouble had been experienced with the radiators and steam pipes in a public building where he first used a white primer and then superior aluminum bronze, using a first-class bristle brush, but was unable to satisfy his patrons. The work was done on the cold metal. Would like to know whether the primer should be baked on and the aluminum applied afterward, or whether the bronze should be applied to the cold iron? And should the material be applied when the radiator or pipes are hot or cold, so as to get best results? Can it be expected that the bronze will be free from any unevenness or cloudy effect?

When wet bronze is employed a priming coat of white, tinted with a trifle of lampblack and ultramarine blue, prepared in such a manner that it will be baked hard by the heat generated in the radiator or steam pipes, should be applied for aluminum. On this coat bronze mixed with aluminum size is applied, but not brushed on like ordinary paint, rather with a stippling motion than otherwise, because in that way the covering appears more solid. If this does not appear solid enough, then take dry bronze on a top or wad of cotton and rub over the wet bronze before it fully sets, and thus give it a solid appearance. Or apply a coat of bronzing liquid over the primer and before this fully sets dry bronze the surface. If you wish to dispense with the primer, see that your surface is free from grease and rust, mix your bronze with good banana liquid and apply with a brush as above. Gold bronze can be applied in similar manner.

—893—

Covering Capacity of Aluminum Bronze Paints and Aluminum Bronze Powder.

How much surface will one gallon of liquid aluminum paint cover; also what area may be covered with one ounce of aluminum bronze powder over size?

It will depend very much on the sort of liquid used in the aluminum paint. That made with the so-called banana liquid will not spread over as much surface as that which is made with a very thin liquid, composed of copal varnish and benzine. On a smooth surface the latter should cover at least 800 square feet, one coat to the gallon, while the former would hardly cover more than 700 square feet, probably less.

One ounce of dry aluminum bronze powder, if properly handled to avoid waste, should cover from twenty to twenty-five square feet of sized surface.

—894—

Liquid for Extra Light Lining Bronze.

How can I make a liquid for extra light lining bronze that will not tarnish and stand handling?

Whether your bronze will tarnish more or less readily, depends upon the quality of your bronze. You fail to state what color of bronze you desire the liquid for, nor do you intimate to what sort of handling the object will be subjected. The so-called banana oil, a solution of gun cotton in amylacetate and naphtha will least discolor bronzes and will, when dry, make the bronze adhere best and permits of the same being cleansed after handling, but in lining or striping with same over oil or varnish paint it is apt to raise the same. Unless the lining is done on bare wood or metal, it is best to make the liquid by reducing a pale copal varnish with naphtha sufficiently to make the bronze flow freely from the brush. Such a liquid will have enough binding and adhesive property for most any purpose. If for exterior work, use a slow drying varnish, but for interior use a fairly quick drying varnish is preferable.

—895—

Liquid for Bronze Striping.

The best bronzing liquid to mix with bronze for striping is made from gum animi in the following way:—Heat one gallon of varnish makers' boiled oil and while the oil is heating add two pounds gum animi in powder in small portions. When all the gum is in boil up until all the gum has dissolved, then remove from fire, strain and dilute with one gallon of turpentine. When using thin with turps to working consistency. This, of course, does not dry as quickly as banana liquid, but may answer your purpose, as it will not gum up so quickly. A quick drying vehicle to serve as well as the banana liquid without its disagreeable odor can be made by dissolving in one gallon of alcohol one quart measure full of pulverized gum lac. If this does not flow well on striping it may be made to work more freely by the addition of pure Venice turpentine, previously mixed with its own volume of pure grain alcohol. One gill of this added to one quart of the gum lac and spirit solution will not retard the drying to any extent. First-class finishing varnish, one that dries in twenty-four hours on a coach body, thinned with turps, should also solve the problem.

—896—

Size for Gold Bronze Powder for Stenciling on Distemper.

Mix your bronze powder with one gill ($\frac{1}{4}$ pint) of pure honey to a smooth paste; add one teaspoonful of refined glycerine and enough soft water to make it of the right consistency for stenciling. Should it set too rapidly, add more glycerine. A little experimenting will give the proper proportion for any kind of bronze.

—897—

Bronzing and Gilding Mirror Frames.

The best method of bronzing and gilding large mirror or picture frames, especially such as have been gilded all over before but are to be done according to a new idea, the body of the frame to be in bronze while the raised portions are to be done in gold leaf, such as may be seen on exhibition in art picture stores, was asked.

First clean the frame by going over the gilded portion with a small sponge that has been moistened with alcohol or spirits of turpentine. The sponge should only be wet enough to take off the dust and fly specks, and the frame must not be wiped, but permitted to dry of itself. Then apply the bronze to the frame, wet if the effect is not to be a burnished one, dry if it is to be burnished. If dry bronzed and burnished the frame must be carefully dusted, then two coats of water gold size are applied to the portions to be gilded, but care must be taken to prevent the size from spreading over the bronzed parts. Water gold size is made from pure parchment or isinglass dissolved by boiling in pure water, similar to the gold size used for laying gold leaf on glass, but a little of very fine yellow ocher is added to give color and body. In this size the gold leaf is laid in the usual manner, and when dry a pencil is moistened with clear water and passed over the gilt to remove any loose particles of gold. Should any spot be imperfectly covered take bits of the leaf on a dry pencil and lay it on as before, and finally go over all of the gilt with clear parchment or isinglass size, using a camel's hair brush. Another method for gilding is to grind up some gold leaf with honey in a porcelain dish, using a glass stopper or agate. When fine, place the resulting paste in a glass of water, to which a little alcohol has been added; stir well and allow the gold to settle, pour off the water, wash the sediment again and repeat until the gold is recovered in fine, dry powder. This powder, mixed with 2 per cent. of its own weight each of common salt and cream of tartar mixed with water, may be applied with a brush, and serves the same purpose as gold leaf, but is a rather tedious process.

—898—

Gold Paint or Gold Lacquer for Metal.

How to make a quick drying gold paint or gold lacquer for metal that will stand well on interior ornamental work was asked.

Digest 16 ounces orange gum shellac, 4 ounces gum mastic, 4 ounces gum sandarac and 2 ounces gum gamboge, all carefully bruised in one imperial gallon of spirits of wine in a glass jar or bottle, well stoppered, shaking the vessel occasionally until all the gum is dissolved; then strain through fine cloth. Have metal clean and apply with a soft brush of proper size. A lacquer or varnish to make a surface that is painted yellow appear like gilded work is made as follows:—Pulverize one-half ounce of saffron and one-quarter ounce of dragon's blood and put this into a glass jar containing one gallon 95 per cent. spirit of wine, add one pound of orange gum shellac and one ounce Socotrine aloes; dissolve the whole in a water bath by gentle heat, keeping the jar well closed to prevent loss by evaporation. When nearly cold strain through fine cloth.

—899—

Banana Liquid and Its Wearing Qualities with Bronze Powders.

Banana liquid, or banana oil, as it is generally called, derives its names from its odor, which is very similar to that emitted from banana peelings. It consists of guncotton, dissolved in amylacetate, which is known to the trade as pear oil, and is a combination of fusel oil and vinegar. In order to make the article marketable as a liquid for bronzes as much benzine is added to the solution of guncotton and amylacetate as it will stand without precipitating the former. Hence it is guncotton in a solution of amylacetate and benzole or benzine. Its advantages as a bronze liquid are, that it does not discolor the most delicate bronzes, that it is the best liquid for use on exposed surfaces, as well as for interior use, that it does not crack or powder off, that it mixes freely and works well and does not require dryers or any other addition.

It does not require any priming, when applied to metallic surface, as it can be made to cover well in one coat. Nor is it necessary to give iron a first coat to prevent rusting, because it is a better rust preventive than any oil paint. There are, however, a few objections to its use. First, the very penetrating odor, which, though not affecting every one, is disagreeable to many, when the liquid is used in closed rooms. Secondly, the tendency of the liquid to lift up coats of oil paint or varnish, acting as a paint and varnish remover in many cases, unless worked very deftly.

—900—

The Bronzing of Plaster Coats.

A soap is made from linseed oil and caustic soda, which is precipitated with a solution of common salt and then filtered. Then a solution is made of four parts of vitriol of copper and one part of vitriol of iron in hot water, which is added to the above filtrate, when a flocculent precipitate is formed that contains oxide of copper and iron in combination with the fatty acids of the soap and is reddish brown in color. This precipitate is repeatedly washed, first in hot, then in cold water, pressed and dried.

Now eight gallons of pure raw linseed oil are boiled with eight pounds of litharge (must be powdered), then filtered and allowed to clear. When clear, fifteen parts by weight of this boiled oil and twelve parts of the dried copper and iron soap and five parts of white beeswax are melted together at moderate heat, and this liquid is applied with a brush to the figures, which have been previously heated to 200 deg. F. Then they are exposed to the air for a few days to dry, rubbed off with a woollen cloth and touched up with bronze powder at edges or other raised lines. Small articles may be dipped in place of brushing.

—901—

How to Make Quick Drying Size for Aluminum Leaf and Gold Leaf.

A good size, on which the leaf may be laid in four hours, is made from two gills of gold size japan and one gill of fat oil. For a twelve-hour size, take one-half pint fat oil and a dessertspoonful of gold size japan. For gold leaf add to the size a dash of medium chrome yellow that has been ground in japan. For aluminum leaf the size may be used clear or with a dash of flake white in japan. For good work that is to wear well and show a good burnish we would recommend the twelve-hour size, or, still better, fat oil only.

—902—

Wiped Verdigris Finish in Imitation Patina.

Use a ground made from about 25 pounds of pure white lead in oil, 3 pounds medium chrome yellow, 5 pounds Venetian red with enough burnt umber to make a color resembling dirty copper. Apply as many coats as are required to give a good surface, making the last coat so as to dry semi-flat. When dry and hard, apply copper bronze, dry or wet, as you choose, using a good outside varnish, thinned with turps, as a medium to hold it. If you do your bronzing dry, remove the excess of bronze with a wad of cotton; if wet, you can go right over it on becoming hard with either of the following:—Make a glaze from French distilled verdigris that has been ground fine in varnish and is thinned with turpentine, so as to produce an egg-shell gloss on drying, or make a stain from raw umber that has been ground in japan, thinning with equal parts of coach or outside varnish and turpentine. Before the glaze or stain has an opportunity to set hard, take a cloth and wipe out the high lights, thus producing the effect of antique copper bronze. If there is sufficient ornamentation, the effect is a very pretty one, especially when verdigris is used. Many public building fronts are being done in this manner.

—903—

Bronzing Picture Moldings.

So far as we know, picture moldings formerly were bronzed by using a special varnish, from which all the acid features that might attack the bronze had been removed by treatment with caustic soda. But at the present time they use lacquers in imitation of bronze or where they still use gold or aluminum bronze they use a binder identical with or similar to the banana liquid. This liquid is a solution of cellulod in amylacetate, and if you get the pure article you can depend upon its standing the weather very well and that it will not tarnish good bronze powder. Whether it will stand water we cannot say, but we rather think it will do so, for a time at least.

Brass lacquer of the proper sort, with spirit of wine as the medium, may be applied over gold bronze, but not for exterior work.

—904—

To Keep Dry Bronze from Sticking to Glass and Japanned Tin.

Trouble was experienced from the sticking of aluminum bronze on glass and japanned tin signs. The letters were painted with a liquid made from spar varnish, japan and white lead. When the size became tacky the bronze was dusted on, but the surplus bronze was difficult to clean off.

See that your glass and japanned tin is thoroughly dry, and dust all over the surface before applying the size some finely powdered talc or chalk, which may be dusted off when the bronze on letters or stripes has become adhesive, and in dusting the bronze or gold will come off with the talc or chalk.

—905—

Vehicle for Aluminum Bronze Paint.

The so-called "banana oil" is not the only medium for mixing with aluminum bronze, but it is about the best medium for exterior bronzing, because, in spite of its quick drying, it retains its elasticity under severe exposure and has no discoloring effect upon the bronze. A good hard gum varnish that is fairly pale, reduced with spirits of turpentine to good flowing consistency, will also serve as a good medium for aluminum bronze for exposed work, especially for ornamental sign work. For inside bronzing, where banana oil is undesirable because of its odor, any good copal varnish, reduced with turpentine or benzine, will serve as bronzing liquid, providing it does not diminish the luster of the bronze perceptibly.

—906—

Size for Aluminum Bronze on Glass.

A sign writer wanted the best size for aluminum bronze for outside lettering on windows. He puts the bronze on dry, using first coat coach varnish, to which just enough yellow is added to color it the least bit. He has good results, because it sets quick and lasts well, except in cold weather, when it works too stiff. If thinned with turps it does not stand well.

We think your method perfectly proper for that class of work, but you must remember that a first coat coach varnish is not considered a first class article for wear and durability. It is simply a filler for succeeding coats of varnish, and you should use what is known to the trade as durable body varnish, and of this only the best-known brands. This will work more freely, and can be thinned in cold weather with a little turpentine without injuring its durability to any great extent. We would advise you to add to the varnish a little white lead in oil or flake white in japan, that has been tinted a very light lead color with a touch of lampblack. A teaspoonful of this to a pint of varnish is sufficient.

—907—

How Cast Iron and Polished Steel May Be Bronzed.

After thorough cleansing of the cast iron articles, immerse them over night in a saturated solution of sulphate of copper and they will acquire that color. When coated, they must be well washed in clear water. To bronze polished steel put into a large enough bottle one quart methylated spirits, eight ounces gum shellac and one ounce gum benzoin. Set the bottle in a warm place and shake the bottle occasionally. When dissolved, decant the clear liquid and strain the balance. Mix the varnish to suit with finely powdered dry bronze green, varying the color to suit with yellow ocher and lampblack. Apply the mixture, after warming the articles, in two coats.

—908—

Painting Plaster Casts to Imitate Effect of Old Bronze.

This may be accomplished in a number of ways, the shortest way being to apply several coats of glue, soap and alum size to the cast to stop suction. Then bronze over with green copper bronze mixed with bronzing liquid. Apply a thin coat of paint made from raw Turkey umber in oil, thinned with linseed oil, drier and turps. When this coat is just beginning to set, wipe it off from the high lights lightly with a cloth, allow to dry and give a coat of flatting varnish for protection.

—909—

Bronzing Liquids—How They Are Made.

How dark bronzing liquid is made and whether or not liquid drier would answer for bronzing.

The color of bronzing liquid depends upon the base used, which is usually a varnish made from resinate of lime or hardened rosin with oil and benzine as the solvent or thinner. Liquid driers are usually made on the same plan with an excess of lead or manganese salts fused with the oil and rosin at high temperature, which accounts for the dark color of the material. Turpentine, on account of its acid reaction on bronzes, should not be used in bronzing liquids. For very quick work liquid driers, thinned with two volumes of benzine to one volume of the drier, will serve the purpose, but any good copal varnish or inside varnish, thinned with three parts its volume of benzine, will serve as bronzing liquid for interior work. For exterior bronzing, the so-called banana liquid is by far the most durable.

—910—

Formula for Bronzing Liquids.

In preparing bronze liquid, it is most essential that the use of turpentine as thinner be omitted, because the acidity in turpentine attacks gold or copper bronze, turning it green, and causes aluminum or silver bronze powders to lose luster.

A bronze liquid for hot surfaces, such as radiators, steam pipes, etc., is best made from a pale gum (not rosin) varnish by thinning one part by measure of such varnish with four parts by measure of solvent naphtha (coal tar benzol). This is to be preferred to ordinary benzine (petroleum spirit) because it permits of slower setting, therefore easier and more uniform application. Such a bronze liquid will bake onto the surface and is practically indestructible. For interior bronzing, any good quality of inside varnish, one part to four parts of benzine or benzol, the latter preferable, because slower setting, will answer, while for exterior work a good medium drying outside varnish, thinned, one part varnish to three parts benzol, is to be highly recommended. But the so-called banana oil or banana liquid (a solution of gun cotton in amylacetate and petroleum spirit) makes the most durable medium for exterior bronzing, its defect being, however, that it cannot be applied over paint or varnish, because it lifts these, acting as a paint and varnish remover to a certain extent. Nor can this so-called banana liquid be used with gold or copper bronze, because it has a similar action on these to spirits of turpentine. Also, the odor is not an agreeable one to many persons.

—911—

Bronzing Liquid for Gold or Aluminum Powder.

Formula for making a liquid for either gold or aluminum bronze, to be used principally on radiators and be of good wearing quality.

It is well known to experts that turpentine should not be used in a gold bronze liquid, because the acidity in turps invariably tends to "green off" gold bronze. In this case, as well as with copper bronze, the liquid must be neutral, i. e., free from acid. An excellent liquid for gold, copper or aluminum bronze, that can be quickly prepared and which will stand well on radiators and other interior work can be made as follows:—Pound best damar gum in a mortar to a coarse powder and place one part by weight in a wide mouthed jar or glass bottle with a handful of granulated glass to one pound of the gum. Pour over this nine parts by weight of benzine, 63 degrees Be (not gasoline, however), cork tightly and shake occasionally or agitate with a clean wooden stick, until only a fine sediment and the glass is left. Pour off the clear solution and throw away the sediment. By using 90 per cent. coal-tar benzol or solvent naphtha, the

liquid will not dry as rapidly, but will work far smoother. To insure non-acidity in the liquid, a small portion, about one-half ounce to the pound of gum, of caustic lime is introduced with the glass.

To make a good commercial grade of bronze liquid for radiators, that will bake on the hot surface with good luster, select any pale quick drying hard gum varnish, one that does not contain turpentine, but which has benzine for its solvent, and to one quart of this varnish add three quarts of benzine, or, still better, a similar quantity of 90 per cent. benzol, not forgetting a piece of burnt lime. Let stand at least 24 hours, shaking the container several times, then allow to settle until clear, decant into bottles and set away for future use. If the liquid has insufficient binder, add more of the varnish; if it does not flow freely enough with the bronze, thin it some more with benzol or solvent naphtha.

Much more expensive, but far better for wear, is the collodion varnish, known as "banana liquid," a solution of guncotton in amylacetate. When made as a lacquer, it dries quickly and produces an enamel-like surface with bronze, is washable with soap and water or gasoline, but as sold commercially it is mixed in almost equal portions with a cheap gum and benzine varnish. But even then it is superior to the ordinary bronzing liquid and will stand exposure to the weather far better. The only drawback is that a surface covered with it cannot be painted over with oil paint or coach color, nor can it be placed on such painted surface, as in such case it acts as a paint and varnish remover.

—912—

Matt Bronzing as Seen on Picture Frames.

What may be added to bronzing liquid or gold bronze (or to both) in order to produce the matt bronze effect, that may be seen on bronzed picture frames?

Measure out one-half pint gum lac (shellac), bruised, and place in a wide-mouth glass jar; add one quart denatured alcohol, cork up well, place jar in a warm place and shake occasionally until the gum has dissolved, then strain. Add three parts by weight of the solution to one part by weight of gold bronze and apply with a brush, but do not go over it more than once. If the surface is not well covered with one coat, apply a second one. This will produce a matt effect, but if well rubbed with a wash leather, after drying, it will show good luster. If you reduce your bronzing liquid to the utmost with 90 per cent. benzol (coal-tar naphtha), you can also obtain the matt effect, but be careful that you do not destroy the binding property of your liquid.

—913—

Precipitation in Zapon Lacquer and Bronze Liquids.

In preparing zapon lacquer, as well as the so-called banana oil or liquid, that is used for bronzing, there is sometimes found a milk white flocculent precipitate.

If you use celluloid chips, the flocculent precipitate may be due to the coloring used in the celluloid material, from which the waste chips or cuttings are taken. If you use collodion wool (guncotton) and dissolve it in pure amyl acetate, you will obtain perfectly clear solutions without any precipitate. But in making bronzing liquid, such as is popularly known as banana oil or banana liquid (from its odor), you, of course, use in addition to the amyl acetate, a portion of petroleum naphtha (benzine), and if you go beyond a certain point, you will surely have the precipitate spoken of, which is simply part of your collodion not remaining in solution. The purer and stronger your amyl acetate, the more benzine can be added.

—914—

Refinishing Statuary Bronze Locks on Grained Steel Doors.

The original paint was baked on. The hardware is brass, statuary bronze finish, which in places has been worn to a bright surface. Wanted to know if

the hardware can be refinished in statuary bronze effect without removing from the doors, and if so, how should he do it?

The inquiry in reference to refinishing in statuary bronze the locks on doors without removing them is a matter that comes up frequently, and a method to do this work has been tried repeatedly, but with poor results, and it has never been satisfactorily worked out. If the locks are made in brass metal, a copper plating was undoubtedly used first as a base to get the oxidize onto for the statuary color, as this oxidize will not take on the yellow brass. If the metal is bronze with a lower percentage of zinc in, than in yellow brass, it would oxidize without the preliminary copper plating. But even to prepare the bronze for a new oxidization without removing the locks is impossible, and if it were done while the locks are on the doors the finish could not be kept uniform and the result would be very poor. To do this work right the locks should be removed, put into a hot potash solution to remove the old lacquer and the dirt, then the old oxidization should be removed by putting the locks through a solution made with about one-half pound of cyanide of potassium to each gallon of water. This then leaves the copper plate or bronze clean and ready for reoxidizing. If the metal is yellow brass and has been copper plated, the copper plate will also be worn through to the brass, and it is then necessary to copper plate the whole lock to get a uniform copper base to oxidize onto. After the copper plating is done it should be dipped into the oxidizing solution, which is made for statuary bronze color with about one-half ounce of sulphuret of potassium to one gallon of water. Then it is rinsed in cold and hot water and afterward scratch-brushed on a wire scratch-brush running at a speed of about 600 revolutions a minute. The scratch-brushing brings the brown color of the statuary. The oxidize can be made from light to dark, according to the amount of sulphuret of potassium used. By removing the locks the work can be done very much cheaper than to attempt to do the work with the locks on the doors and the finish will then be right. Where it has been tried without removing the locks the old lacquer has been removed with lacquer thinner, the old oxidize removed with the cyanide of potassium solution and then the oxidizing solution was swabbed on. This is a slow process and has never been accomplished with even fair results.

—915—

Acid-Free Bronzing Liquid for Picture Frames.

How to prepare an acid-free resinous liquid for gold bronzing picture frames, etc., so that the bronze powder will not oxidize when in admixture with the liquid for some little time.

Place in a wide-mouthed jar of one-half gallon capacity one-half pound gum damar in powdered form and one quart petroleum spirit (benzine, not gasoline). Cork tightly and shake often until the gum has dissolved, which will require about twenty-four hours. Now add to the solution one-half pint of a 10 per cent. solution of caustic soda, cork again and shake the jar for a few minutes quite vigorously. After a short while on standing there will be two layers or stratas, the upper one a solution of resin in benzine, the lower one an aqueous solution that contains the resinous acid dissolved in the sodium salt. The upper layer is poured off or carefully decanted and another half pint of a 10 per cent. solution of caustic soda added and the process repeated, when the solution is allowed to stand until thoroughly clear. This will give you a bronzing liquid in which you can keep gold or copper bronze for years without oxidation, always provided that the mixed liquid bronze is kept in well-sealed bottles, otherwise there will be a faint greenish discoloration apparent after a time. If you cannot prepare the caustic soda solution yourself any druggist in your town can do it for you.

—916—

Liquid Bronze for Drawing on Paper.

In order to be successful, it is necessary to select only the purest and extra fine bronzes, as the ordinary grades are too coarse and heavy. To prepare the

liquid, dissolve 12 grammes of pure genuine gum arabic in 100 cubic centimeters of distilled water and, in a suitable porcelain dish, rub as much bronze and liquid together until you find on trial with a camel's hair pencil that it will cover smoothly and uniformly on a piece of white paper. When ruling or drawing on paper with a pen, the pen must be held in a very much inclined position and must be wiped out quite frequently, because the liquid inclines to drag on account of rapid thickening. The bronze when used with the pen must be made more liquid than for use with brush or pencil. It is advisable that the liquid before being mixed with bronze be strained through linen, so as to avoid grease and little lumps. If the liquid bronze is to be used with a drawing pen for ruling, the pen should not be filled too liberally, as in such case blotches may result. In order to make the liquid bronze flow freely a small addition of oxgall is to be recommended, which will make it work well, even on poorly sized paper or pasteboard. When the liquid bronze, on long standing, has dried up in the dish, a few drops of warm water rubbed in lightly with the finger will make it again suitable for use. By a little experimenting and observing the instructions here given you will succeed, and always remember that practice only makes perfect.

—917—

Heat-Resisting Silver or Aluminum Bronze.

Since aluminum bronze powder is used so generally, silver bronze is practically obsolete. Aluminum bronze is not only cheaper, but more durable, while silver bronze invariably turned black rapidly. To make the bronze heat resistant the medium with which the powder is mixed must contain a gum that has a high melting point. Amber would be best for the purpose, but it is very expensive and rather dark in color. Zanzibar and kauri copals are hard gums, requiring high temperatures for melting, therefore it is best to select these. Take, say ten pounds of either of these gums of the pale variety and carefully melt on a uniform fire, adding one pound resinate of manganese and six pounds of prepared China wood oil. When melted take from fire and cool down some, but while still hot thin with 25 pounds spirits of turpentine and filter. Into this batch when cold stir 20 pounds good aluminum bronze, beat well in a mixer and strain through a fine wire sieve. Then add 20 pounds more of turpentine and 18 pounds benzine. This liquid bronze will have excellent covering power and under certain conditions could be thinned still more.

—918—

Keeping Bronze on Radiators from Peeling.

The reason for peeling is that bronze applied directly on the iron does not adhere, because most bronzing liquids lack sufficient binder to withstand the heat. Very often the metal is rusty, but this can be remedied if the iron is given a thin lead-colored primer, which contains some varnish and is allowed to dry hard before the bronze is applied. The bronzing liquid should consist of a varnish that will bake on the metal when heat is run in the radiators. The varnish should be thinned with benzine, not with turpentine.

As to a white radiator enamel, it is difficult to keep it white for any length of time, because of the great heat from live steam, which will cause the enamel to turn yellow. This is less liable to happen in the case of hot water heating.

—919—

Painting or Bronzing Steam Radiators.

Iron radiators require no filling, as the castings are usually smooth enough. To make a good job in gold bronzing proceed as follows:—Apply to the iron a thin coat of japan gold size, and while still tacky put on the gold bronze powder with a bunch of cotton or a brush. To save bronze, place a shallow tin pan

of sufficient length and width on the floor under the radiator to catch the surplus powder. If you get the right degree of tackiness, you get good covering with one-half the amount of bronze than you would if you used liquid gold paint, and moreover the finish is more lustrous, because in dry bronzing you can polish with a woolen cloth or chamois skin. Gold bronze mixed in the liquid way and so applied is apt to show up somewhat greenish. It is best to have the radiators slightly warm when bronzing same.

—920—

Bronzing with Stencils on Kalsomine or Oil Paint.

For stenciling with bronze on kalsomine or distemper mix your bronze powder with gum arabic and water; for painted surface use bronze liquid or make the bronzing medium from varnish thinned with petroleum spirit (so-called turpentine substitute), but do not use spirit of turpentine, as this is liable to make gold bronze turn green. In either case use a good stencil brush, as the plush on a roller will pack hard with bronze and work hard.

—921—

Bronzing with Pure Gold Leaf Instead of Laying the Leaf.

Pure gold bronze powder can be made and used in the manner you have in view by grinding pure gold leaf with a pestle in a porcelain mortar with honey until the leaves are broken up and finely divided. Stir up the mixture of gold and honey with clean water, which will dissolve the honey and set the gold free. Let the dish set undisturbed until the gold has settled, then carefully decant the water and add fresh wash, repeating the operation until all the honey is washed out. Now collect the gold on filter paper or cloth and dry with gentle heat. To apply the gold, mix it with japan gold size for inside work or with oil gold size for exterior and use a suitable brush. If one layer does not give sufficient luster, give a second coating. The wearing quality depends on the purity of the leaf and on the quality of the size. For mixing the leaf use none but pure bees' honey. Dutch gold may be similarly treated, but lacks luster and wearing quality.

STENCILING.

—922—

Brown Shellac Varnish for Fresco Stencils.

The proportions of gum and alcohol required to make varnish for stencil coating was wanted.

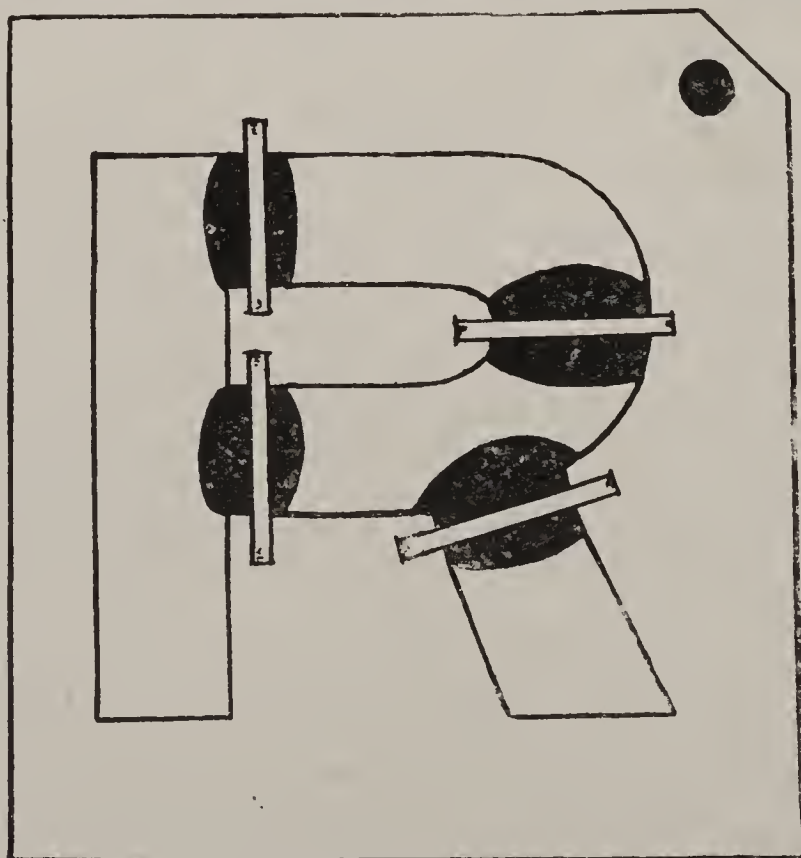
The shellac varnish required for stencil work must not be too stout, and you can prepare it by placing in a wide mouth jar one-half pound of brown or orange gum shellac and one pint 95 per cent. alcohol. If the odor is not objectionable, you may use wood alcohol in place of the spirits of wine. Cork the jar well and stand in a warm place, shaking it frequently. If, on your gum being dissolved, the varnish is too thick to spread freely and evenly, add more alcohol. Coat the stencil on both sides, and when dry lay it on a slab or plate or other thick glass, using a very sharp penknife for cutting, and there will be no tearing of the paper. If you desire to make it more serviceable, however, you may paste the stencil on strong brown paper, but you will have to shellac varnish it, at any rate, in order to have it cut clean.

—923—

Freight Car Stencils.

In a good many freight car painting departments the tin or zinc stencil is still doing duty. At its best the metal stencil is an uncomfortable stencil to work with. It buckles and gets out of shape easily, and to get it to lay down firm and close to the car is an impossibility, especially after a short term of service. Tough, but light, manila paper, properly prepared, makes a much better stencil—one that is easily handled, hugs the surface of the car snugly, whatever its inequalities may be, and, with proper usage, wears durably.

To make the stencil of paper, proceed as follows:—Lay out the letter, or letters on one side of the paper. Then on the reverse side apply at least two coats of shellac. Take a piece of muslin large enough to cover the stencil, and to this apply a coat of shellac. While the last coat of shellac applied to the paper is still moist spread the muslin on, smoothing out firmly until a smooth, unwrinkled surface is obtained. Next turn the paper over, and to the surface

*Figure 1.*

upon which the letters have been drawn apply a dressing of raw linseed oil. Wipe off and follow presently with a coat of shellac. In due time this thickness of paper, muslin and shellac will harden to such a point as to make it extremely difficult to cut with the sharpest knife, and it is, therefore, advisable to cut the letters out before the shellac hardens overmuch. To do this, first cut sections out where the metal ties, either in the form of wires or narrow, flat strips of metal, are to go. In figure 1, used to illustrate the cutting and placing of the ties, may be noted sections cut out and the insertion of the ties. These are drawn through and the ends bent over and clinched. The remaining portion of the letter may next be cut out, the ties first placed serving to stiffen and hold the paper in shape during the cutting. Figure 2 shows the completed stencil cut out, and ties

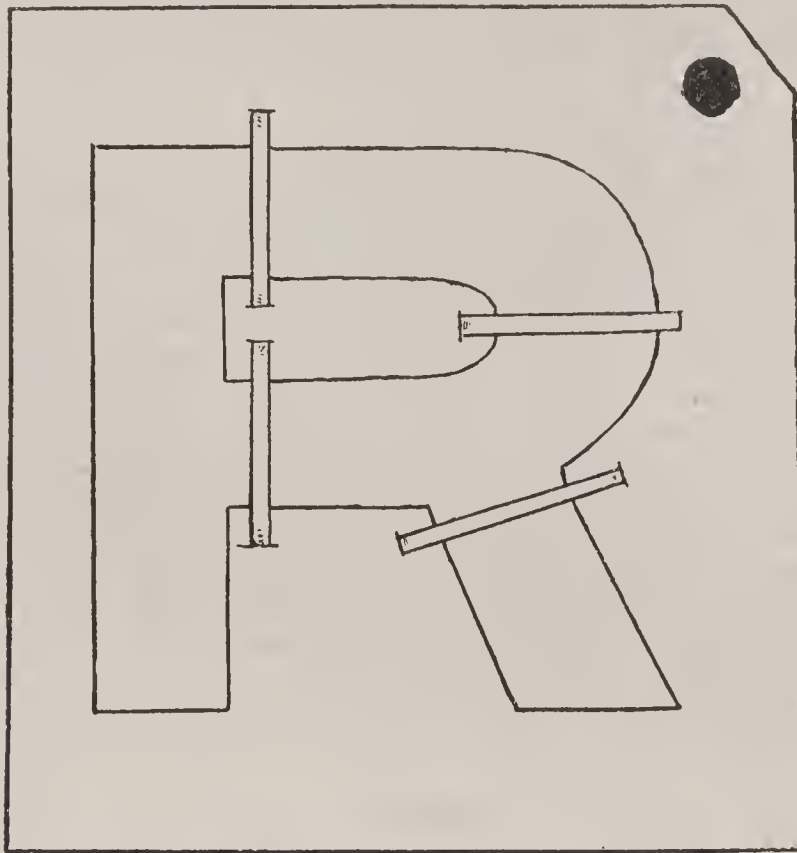


Figure 2.

in place. The perfect shellacing of the paper and the muslin insures a material that cuts clean, with no raveled edges, whereas, if the shellacing is incomplete, the paper will not afford a clean-edged letter. Altogether, this method of preparing and cutting a stencil furnishes a tough, flexible and easily handled stencil.

—924—

Stencil for Freight Cars.

A type of stencil quite extensively used for freight car work in the West is cut out of heavy paper in the usual way, except that no bars are required for support to the encircled portions. The prepared paper is then pasted to fine wire netting and in most cases is mounted on a frame. For attaching the paper stencil to the wire gauze common glue is used, prepared in the ordinary way, and to each one-quarter gallon of glue three ounces of glycerine are added. These stencils are unusually tough and durable, and have all the elasticity characteristic of the soft flexible paper stencil. Upon close inspection, however, the work done with this type of stencil shows the peculiar "matt" effect due to the netting of the wire. While this is not a really important disadvantage, it is one chiefly objected to by Eastern railway authorities.

—925—

Cake Stencil Paint.

If the stencil paint is desired for marking wood, such as boxes and packing cases, a size is made of dextrin and water, four ounces dextrin to the gallon of

water, to which a few drops of carbolic acid may be added. For black paint, use lampblack, moistened with a little vinegar and made into a thin paste with the size. Then add sufficient bolted china clay (kaolin) to make a fairly stiff paste, which is put into molds of the desired shape and allowed to dry. When used, the stencil brush is simply moistened with water and rubbed over the cake. For red paint, substitute strong red oxide of light shade for the lampblack. A cake stencil ink can be prepared as follows:—One pound gum mastic in drops, one and one-half pound orange shellac and two ounces Venice turpentine are melted together, one pound beeswax and six ounces tallow are then added. When all is dissolved, add six ounces hard tallow soap shavings and mix thoroughly, then add such coloring matter as lamp black, Prussian blue, vermilion or red lake, chrome green, chrome yellow or any other pigment, and put into molds. The cake should be brittle. Moisten brush with turpentine or benzine.

—926—

Oil Colors for Stenciling on Cloth.

You can make stencil ink by dissolving in a small quantity of water four parts by weight of gum shellac and one part of borax by boiling until a perfect emulsion of the consistency of syrup is had, then add logwood or Brazil wood extract or soluble coal-tar reds for red, soluble Prussian blue for blue, nigrosene B for black, until the color is strong enough. Acid is not required, and, at any rate, must not be used, as it would injure the cloth, no matter how weak it would be employed. For stenciling with pigment colors the colors in oil are best, but if too oily the excess of oil must be removed in the usual manner, which, in a small way, is best done by placing the color on blotting paper, while if the colors are used in large quantity printer's ink colors are best, where elasticity is required. They are simply thinned some with turpentine. For quick drying stencil colors would suggest colors ground in coach japan like those used by car and carriage painters. The main point in stencil colors is that they do not run or bleed out beyond the lines, but rather leave the outlines sharp.

—927—

Clear Cut Lines for Stencilling on Glass.

Make your stencil tough and pliable by coating it with a mixture of equal parts paraffine and benzol, allowing it to dry before using it. Have your color ground in raw oil to consistency of cream, adding paste drier. Spread the color thickly on blotting paper about one hour before using, which will absorb the surplus oil from the color. Then thin it with turpentine and you will find it will not clog the stencil, nor crawl on the oil color. Use a good stencil brush, dip lightly into the color and dab it on carefully.

—928—

Stenciling on Distemper or Egg Shell Oil Paint.

Before use coat stencils well with paraffine wax, dissolved in benzol or benzine and give them plenty of time to dry free from tack. This will not only make them tough, but also durable. Stenciling color should be ground fine in linseed oil, medium paste form, and enough good japan drier added to make them to consistency of soft batter. This is spread on blotting paper about an hour before using which will absorb the excess of oil. The color so treated, when thinned further with pure turpentine, will work freely on surface painted with oil or distemper paint and will not clog the stencil. For stenciling distemper with bronze powder, the latter should be mixed with glycerine, honey and water. Dry stenciling is best done by first varnishing the surface. When the varnish has become tacky a piece of wash leather is dipped into the bronze powder or any dry color selected. Dab over the perforations of the stencil and a good result will be secured.

PAINTING ON CANVAS.

—929—

To Keep Oil Colors from Spreading on Textile Fabrics.

Information was asked about the proper medium to be added to oil colors to keep them from spreading on textile fabrics.

The addition of pure beeswax dissolved by heat in spirits of turpentine and boiled linseed oil, at the rate of one-half pound of wax to three pints boiled linseed oil and one pint turpentine. This can be done in a water bath to avoid the risk of fire. If the parts of the textile fabrics to be painted are first sized with a solution of four parts gelatine in ten parts water, to which from ten to twenty drops of glycerine have been added for a quarter pint of the solution, there need be no fear of spreading, even without the addition of the wax, providing the colors are not too oily and are thinned for spreading with turps and driers. Under certain conditions the addition of Venice turpentine or Canada balsam will also prevent the spreading of oil colors. Some painters add copal varnish of good stout body in small portions. The principal point is to have the colors as free from oil as possible on first coat. Of course, where there is only one coat applied, the wax, oil and turps mixture is the best means to overcome the spreading tendency.

—930—

Has White Lead and Linseed Oil Paint a Tendency to Rot Canvas?

We believe it to be a well-established fact that linseed oil will rot canvas, even without being in combination with white lead or any other pigment. Linseed oil, being a drying oil, shrinks in drying, and it is only natural that when canvas is fairly saturated with it that it exerts its influence on the fiber of the fabric. We know that linseed oil paint dries by absorbing oxygen from the air, and that when the paint is thoroughly dry the oxidation process is at an end.

From the time when the oil in the paint has rosinified the process of destruction begins, the paint becomes more brittle and the canvas under it shares in the decay. This seems to hold good no matter what pigments may be mixed with oil, though the inert pigments may prolong the life of the oil. It may be taken for granted that some of the awnings that had been noticed, where the painted parts appeared to decay more quickly, have been coated with some very inferior material, paint that had been overloaded with cheap driers, which become brittle at an early stage, and so made the canvas decay more readily than even pure linseed oil would. The remedy or preventive is to size the canvas, so that the linseed oil paint cannot penetrate into the fiber, and the best size is pure beeswax dissolved in pure spirits of turpentine. This size may be prepared on a water bath, same as is used for heating glue. One-half pound yellow beeswax and one-half gallon of turpentine is about the right proportion. Give one or more coats of this to the canvas and when dry apply any oil paint desired.

—931—

Waterproof Canvas That Will Remain Flexible.

There are several methods of doing this; some of the best are as follows:—

No. 1. Soak glue in twice its weight of water for five hours, then dissolve the glue by heating, and mix the solution with an equal weight of chrome alum, in which the chrome alum is equal in weight to the glue previous to soaking. Put the canvas on a stretching frame and give it one coat of the above mixture with a brush, before the mixture sets. Make only sufficient of the mixture to cover the canvas, because, when it sets, it cannot be liquefied again.

No. 2. Steep the canvas in a medium strong solution of gelatine and dry it, and repeat the operation once or twice until the canvas is quite impervious to

cold water, then steep the canvas in a strong solution of chrome alum for twenty-four hours, and afterwards hang up to dry.

No. 3. Ingredients:—One gallon of cold water, one-quarter pound of glue, two ounces of soap.

Soak the glue for several hours in the water, then put in the soap, cut up small and heat the mixture until it boils, then boil the canvas in this fluid for several hours, the time required being dependent on the kind of textile and thickness of the canvas. When perfectly saturated, wring out the excess of liquid and expose the canvas in the air until nearly dry, then steep for several hours in the following solution:—One gallon of water, three-quarters pound of alum, fifteen ounces of salt. Then finally wring out, rinse in clean water and dry at a temperature of about 80 degrees F.

H. C. Standage.

—932—

Painting the Canvas Top of an Automobile.

How can a red paint for the canvas top of an automobile be mixed so that it will not crack?

Take keg lead in oil and add about five pounds fine whiting to twenty-five pounds of lead. Thin with one part raw oil and two parts coach japan, and bring the mixture to flowing consistency with a moderate quantity of turps. Tint this with Indian red in oil to a very dark pink. This is for first coat, but before applying it, first apply a rye flour paste, which permit to dry, and go over with No. ½ sandpaper to knock off nibs. For second coat use keg lead in oil, tinted with the Indian red as before and thin with one-fourth raw oil and three-fourths coach japan, and add turps enough to flow freely. Then apply one coat color and varnish, the color to be a para red in japan and the varnish a good outside rubbing. When dry, moss it and finish with a high-grade coach varnish.

—933—

Painting an Awning for Roof Garden.

First apply one coat of thin glue size to the dry canvas on the side that is to receive the paint. To one gallon of glue size add one ounce of alum, previously dissolved in hot water. One pound of glue to three quarts of water is about the right proportion, and the size should be applied fairly warm with a four-inch wall brush. A six-inch wall brush would be still better. Two coats of a paint made by mixing pure white lead in oil with the necessary color in oil, thinned with boiled linseed oil and turpentine, in the proportion of two-thirds oil to one-third turps, to fairly stout consistence will make the awning water-repellent. The boiled oil and turpentine feature is suggested because the use of raw linseed oil and drier has been known to rot canvas, especially where glue size has not been used. Three coats are sometimes applied, but two are sufficient. The whole may be coated a tan and the green stripes put on top after the second coat if so desired. There are other ways of waterproofing awnings, but this is the simplest.

—934—

Paint for Canvas Awnings.

Dissolve one ounce of yellow soap in thirty fluid ounces of water by boiling; then stir in one quart of boiled oil, and when cooled, stir in five ounces of gold size.

H. C. Standage.

—935—

Waterproofing Canvas So That It Will Remain Flexible.

The cheapest treatment is to cover the canvas with an oil soap made as follows:—Dissolve ten pounds soft soap in enough hot water to make it liquid,

then stir into this a solution of one pound green copperas in hot water. The sulphate of iron combines with the potash in the soap and the iron oxide is precipitated with the fatty acid as an insoluble iron soap, which is collected on cheesecloth or muslin, dried and then mixed with linseed oil. The soap prevents the oil from becoming brittle, and cracking is thus prevented.

Another waterproofing solution for canvas is made by dissolving equal quantities by weight of gelatine and chrome alum. As several coats must be given and the solution solidifies on standing about, it is inadvisable to make up more of the solution at a time than is needed for one coat.

—936—

Waterproofing Clothing, Oil Skins, Etc.

A water-repellent coating can be made by boiling China wood oil at a temperature of not over 280 degrees F. for from three to four hours, then taking the kettle from the fire and allowing the oil to cool down to somewhere between 135 to 140 degrees F., thinning it with one-fifth its volume of pure turps that has been heated in water bath or steam-jacketted kettle to at least 120 degrees F.

This mixture will give a film that will dry in less than forty-eight hours, and yet is very elastic; may be applied with brush or the fabric may be dipped therein.

Another article for waterproofing cloth is made as follows:—In two gallons of soft water, free from lime, dissolve, after heating the water to 180 degrees F., ten pounds gelatine and twenty-two pounds castor oil soap. Then add ten pounds gum lac, stirring the liquid until all is completely dissolved. Remove the kettle from the fire and add, in small portions, twenty-two pounds powdered alum, which will gradually dissolve. This forms an insoluble alumina soap that is applied with a brush.

Still another waterproofing is made by mixing fifteen parts by weight of litharge with fifteen parts, by weight, of boiled linseed oil, in which latter has been dissolved by heat, one part, by weight, of yellow beeswax. The mixture is allowed to stand for about twenty-four hours, the oil poured off from the settled out litharge, and applied with a brush.

—937—

Lead Solution to Preserve Sails from Mildew.

A clipping from the New York Sun of January 14, 1907, was sent us headed "Way to Preserve Sails. Lead solution helps to repel rain and prevent mildew." The article seems to be copied from the Yachtsman and simply tells how sails treated with a certain lead solution had a much better set and shed water much better than untreated sails of similar make. Our correspondent inquired whether we can tell him what lead salt is referred to in the article named.

From the general tenor of the article in question we take it that it is a saturated solution of white sugar of lead (lead acetate), that is, as much white sugar of lead is dissolved in hot water as the water will hold in suspension. To do this properly a small quantity, say one pound, of sugar of lead is dissolved in one gallon of hot water, permitted to cool, and the clear solution poured off from the precipitate that has formed. The precipitate may be used again in the same manner, thus determining how much sugar of lead is held in solution by a certain quantity of water. We have no doubt but that such solution will prevent mildew in canvas as long as the solution is not washed out by continuous wetting. The two months' trial spoken of in the article is scarcely a criterion to assure actual success. The Scientific American some ten years ago recommended a strong aqueous solution of alum or lead acetate for the same purpose, the latter being the same as that apparently intended in the Sun article.

—938—

Painting with Oil Paint on Muslin or Canvas That Is to Be Rolled Up Frequently and Exposed to the Weather.

Dissolve white beeswax, which is finely sliced, in spirits of turpentine in the cold way, which requires about three days. The mass must have the consistency of soft soap. Now add three-quarters pound of this to two pounds of zinc white, ground in oil, and two tablespoonfuls of soft soap. The thick mass, to which is added a trifle japan, is applied with a large spatula to the canvas, so that all pores are filled and the superfluous material removed with the spatula. When this priming is dry, thin the mass with equal parts of boiled linseed oil and turpentine to brushing consistency and apply one full coat. If this has not well covered, apply another coat. The further manipulation is carried on as in other sign work where oil colors are used.

—939—

Freehand Relief on Canvas-Covered Walls—How to Prepare.

If the canvas-covered walls are well painted, a flat coat of paint is all that is required to hold the relief work, but if the canvas is absorbent, a size composed of equal parts linseed oil, drier and turpentine must be applied in order to give the relief a good hold. In other words, it is necessary to stop suction, and the size mentioned is best adapted to the purpose. Where absorption is very much in evidence, hard oil may be used, but glue size should be avoided.

—940—

Painting on Silk, Satin, Shirting or Linen.

The principal object to be obtained in preparing the fabric is to take care that the stuff does not become too brittle from painting upon it, and this is prevented by using the colors as flat as possible, so that the material does not strike in the fabric too much. In order to stop the colors from coming through on the other side, a size made from four parts of gelatine and ten parts of water, with from ten to twenty drops of glycerine added to each quarter pint of the gelatine and water solution, should be applied on shirting or linen over all the design, while on silk or satin only the outlines of the design should be sized. The size must be dry to the touch before painting is begun. Tube colors in oil are best suited for the purpose, and several applications are required to bring out the effect properly. The colors must be as free from oil as possible, especially on the first coat. To make the colors less oily, extract some of the oil from the color by placing it on blotting paper for a short time. Use brushes or pencils with bristles as short as possible, and trim these to suit. If any part of the painted surface should be matt, go over it with a good, pale coach varnish of the proper elasticity. For large surfaces it is best to draw as much of the oil from the colors as possible, and add to the color a little heavy painters' varnish and enough turpentine to make it flow freely from brush or pencil. For sizing silk or satin that is not exposed to dampness, one part of white of egg and two parts water will answer very well.

—941—

Filler for Canvas or Muslin Banners.

A filler for canvas or muslin banners was wanted, that should be more economical than white lead and should stand exposure to the weather.

You, no doubt, use glue size before you apply your white lead. As banners must be painted with an elastic paint, we would not advise you to use any other white material but white lead, nor would we advise you to use any of the so-called graded leads for this purpose. But as political banners are not required to hold out much over one campaign, why can you not make a mixture of pure keg lead and fine bolted whiting in the proportion of 70 to 30?

—942—

Hanging Canvas to Walls and Painting Same.

How to bring canvas to the walls of dining room and to paint the same in relief, finishing with metallic glaze. What constitutes the metallic glaze?

Glue size the walls, if hard-finished, using one pound of good glue to six quarts water. Have the size fairly warm when applying it. The paste must be rather stiff and two tablespoonfuls of Venice turpentine added will improve it. Have the paste warm when adding the turpentine or balsam. Trim and butt the edges of canvas before hanging and apply the paste to the wall, but also paste the edges, roll down the joints with care and sponge off with clean water, so that not a trace of paste remains on the surface. As soon as the paste has dried you may proceed with the painting. Paint same as you would a plastered wall, but use no size of any kind. Make your paint of white lead and linseed oil with very little drier for first coat, brush it in evenly and permit to dry hard. Have it tinted to suit. Second coat make also of white lead and equal parts linseed oil and turps with sufficient drier. Upon this put your relief, which may be mixed from white lead, bolted whiting, oil, turps and japan and should be stout for combing. Tint this material to suit your metal glaze, which may be made with gold bronze, copper bronze or aluminum, mixed with bronzing liquid or varnish. There are bronze powders of many colors to be had for this purpose. It requires some artistic taste to do this kind of work with pleasing effect.

—943—

Mixing Size and Colors for Lettering on Canvas Awnings.

It depends very much upon whether the awning is to be rolled up or whether it remains stationary, as the wings do in most cases. Also upon the textures of the awning and its weight. When the fabric is light and is to be rolled, the space upon which the lettering is to be fixed should be sized with best gelatine, which is dissolved in water to the consistency of syrup, and to which a few drops of glycerine is added to make it pliable. If the awnings remain stationary a size of glue and soap is the proper thing. One-half pound of glue dissolved in boiling water, one-quarter pound yellow soap, also dissolved in hot water, the two solutions mixed together and applied to the canvas will keep the color from striking through. The colors are regular oil colors as furnished by the manufacturers, thinned to a semi-paste with drier and turpentine or benzine and are the proper materials for stationary awnings, while for those that are to be rolled up very little drier should be used in thinning, and the color held more oily, or, if the work must be hastened, good elastic varnish may be used for thinning in place of the oil. In all cases allow sufficient time for drying.

—944—

Preparing the Canvas Background for a Moving Picture Show.

We should think that the best method to prepare the canvas would be a first coat of white lead in oil, thinned with two parts raw linseed oil and one part liquid drier. When dry it should have one coat, at least, of good glue size, then another coat of white lead in oil, thinned with equal parts linseed oil and turps, with sufficient drier and lampblack to make it a light lead color. On this the aluminum bronze paint would cover so well in one coat that no light could penetrate through the canvas. Of course, the two lead coats would have to be fairly stout, so as to fill the canvas, otherwise more coats would be required. In applying the bronze, the so-called banana oil as the bronzing liquid must be avoided.

We have not heard of the use of silk in front of the background to soften the effect of the pictures, but we can see the point of the idea and think it a good one.

—945—

Painting the Canvas Top of a Delivery Wagon.

We know that paint applied directly on the canvas top of a wagon will rot the canvas more quickly than when it is left unpainted, but the latter method is not as efficient for preservation as painting after the canvas has been properly sized. Glue size will not answer, and varnish size would be as bad as direct painting. We suggest that the canvas be sized at least once, or, still better, twice with a size made by melting one-half pound of pure yellow beeswax and one-half gallon pure spirits of turpentine in a water bath in the same manner as glue is melted. Apply this liberally to the canvas on the exposed side in two coats, as the first coat may strike in too much; and, after the last coat has dried hard to the touch, apply paint of the color desired, using only pure boiled linseed oil and a triple japan drier for the thinners. The beeswax and turpentine size will prevent the oil paint from coming in direct contact with the canvas, thus preventing decay and cracking. When the paint is renewed from time to time, the top will wear longer by far than unpainted canvas.

—946—

Preparing Canvas for Artists' Oil Paintings.

The canvas is first treated with a size made by dissolving gelatine or glue in water. Either must be as colorless as possible. The priming is done with two kinds of paint, the first coat that is applied over the size is best made by mixing the finest bolted whiting with the size above referred to. In applying any of the priming the surface should be crossed and recrossed, as is done in painting a panel. The second coat is usually white lead and drying (linseed) oil, bleached oil being preferable. A third coat, if desired in order to hide the texture of the canvas, is best mixed from zinc white and bleached linseed oil, because this will prevent, to a great extent, the discoloration that takes place when primed canvas is stored in dark places. The back should also be coated with paint to prevent absorption of moisture.

The best canvas for oil paintings is that woven from unbleached flax. Hemp and cotton are very inferior. If the canvas has to be rolled up, after being primed or painted, it is best to add to the drying oil used in priming not over five per cent. of cottonseed or olive oil.

—947—

Waterproofing Canvas Covers for Wagons.

The best material that we ever heard of for this purpose is linseed oil prepared as follows:—In a varnish kettle of 50-gallon capacity place 30 gallons raw linseed oil and add to this 2½ pounds calcined potash and 5 pints of water, boiling these until the mass has become whiting and rather opaque. Then take from fire and add 1½ pounds sugar of lead, 1 pound litharge, 2 pounds red lead and 10 pounds powdered rosin; put back on the fire and keep it at a temperature of 212 degrees F. for at least one hour, keeping the mass well stirred. Now add 15 pounds zinc soap, which is previously prepared by a solution of 56 parts by weight of white soap in three times its weight of water, and the addition of 30 parts by weight of white vitriol (also known as white copperas). The wagon cover must be stretched tight on a suitable frame and the prepared oil applied fairly warm. It must not be removed from the frame until the oil has dried free from tackiness. The addition of white vitriol is for the purpose of preventing mildew.

—948—

Fire Proofing Muslin or Canvas.

Dissolve in 25 gallons of lukewarm water the following chemicals:—Pure ammonium sulphate, 17½ pounds; pure ammonium carbonate, 5½ pounds; pure

borax, $4\frac{1}{2}$ pounds, and pure boric acid, $6\frac{1}{2}$ pounds. When all the chemicals are dissolved, heat the solution until its temperature is 86 degrees Fahrenheit and soak your muslin or canvas therein; wring out lightly and hang up to dry. While not absolutely fireproof, the material is fire-resisting to a great degree, and will not burn on the application of a lighted match. When 5 pounds of starch are added to the solution above given, the muslin or canvas can be ironed after drying, but, of course, this is not required for the purpose you intend it for. Another solution, which it is said will serve the same purpose, is made by dissolving in 12 gallons of water 6 pounds of boracic acid, 15 pounds of sal ammoniac and 3 pounds of pure borax. The canvas or muslin is steeped in the solution for a short time, wrung out lightly and permitted to dry. We think, however, that the first solution given is most effective.

—949—

Finish for Moving Picture Display Curtain.

The muslin or canvas must be nailed to a frame and should be moistened before it is attached, so that in drying it will be stretched as tight as possible. Give it a coat of thin gelatine size, to which a little zinc sulphate in solution is added in order to harden the gelatine or glue. When dry, stipple over the glue with a mixture of three parts raw linseed oil and one part japan drier very lightly, and when this coating is nearly dry, but still somewhat tacky, go over it with a coat of equal parts of white lead and whiting that has been mixed to a smooth paste with equal parts raw and boiled linseed oil and a concentrated pale drier, using a large palette knife for spreading. Put this coating on rather thin and if the texture of the muslin or canvas is not filled by one coat apply another when the first is dry. When perfectly filled sandpaper and apply a gloss paint or enamel paint of the color best suited. The principal requirement is a perfectly uniform and level surface, otherwise the screen will give a marred effect. The mirror screens of plate glass are said to give the best pictures by far, but they are very expensive—really prohibitive in price excepting for the higher class of shows. A very good picture can be shown on a screen prepared in white or light-gray tint, as above, and finished in an enamel made by mixing the very finest and most lustrous aluminum bronze with the best flowing varnish of pale color. Of course, it takes quite a skilled mechanic to apply this finish in such a manner that the screen will not reflect any angles when the picture is thrown upon it.

—950—

Coating Canvas That Has Been in Use.

The most practical method to waterproof canvas so that it will remain flexible is as follows:—Soak good glue in twice its weight of water for five hours, then dissolve the glue by heating. In the meantime make a solution, of the same weight as the dry glue, of chrome alum, using only enough water to dissolve the alum. Mix this with the glue solution and immediately apply a coat of the mixture with a wall brush to the canvas, which has been stretched on a frame. The coating will set quickly and the mixture cannot be used again, as it solidifies.

Another method is to steep the canvas in a medium strong solution of gelatine, and let it dry, then repeat the operation once or twice until the canvas is unaffected by cold water, then steep the canvas in a strong solution of chrome alum for twenty-four hours, wring only lightly and hang up to dry.

—951—

Preparing Canvas for Painting a Curtain That Is to Be Rolled Up Frequently.

Dissolve white beeswax that has been finely sliced in cold spirits of turpentine, which will require several days. If you desire to hasten solution, set the jar containing the wax and turpentine in a bath of warm water. Two pounds

of wax to five pounds turpentine should give a mass of the consistency of soft soap. Mix three pounds of zinc white ground in oil with one pound of the solution of wax and turpentine and add three tablespoonfuls of soft soap. This thick mass, to which a few tablespoonfuls of japan drier is added, is then applied to both sides of the canvas with a large spatula, so that all pores are filled, and before it begins to set the excess material is removed with the spatula. When the priming is dry the curtain is ready for kalsomining, but we believe a far better method for finishing the curtain is to follow the priming by giving at least one, or if required, two, brush coats of the wax, turpentine and zinc mixture, thinned to stout brushing consistency with equal parts boiled linseed oil and turpentine.

Some moving picture shows here in the States use white table oilcloth for their screens or curtains by giving the glossy surface a coat of elastic dead flat white. Perhaps white Sanitas, which has an eggshell gloss, and is a table oilcloth specially prepared for decorators' use, might be preferable.

—952—

Painting Canvas with Smooth Finish.

The best method for this purpose is being followed in the British navy yards, where excellent results are had. This is the process:—Eight pounds of yellow ocher ground in boiled linseed oil fairly stiff, and one pound of lampblack, also ground in boiled linseed oil, are well mixed to a smooth paste, to which is added, while still hot, one ounce of yellow soap that has been dissolved in one-half pint of boiling water. This is applied to the canvas with a stiff four-inch wall brush rubbed in as smoothly as possible and permitted to dry hard, which will require three or four days, according to weather conditions. Then another coat of paint, this time without the addition of soap, but with the addition of more boiled oil, is given, which will dry free of tack in about three days. This makes the canvas impervious to water and prevents rotting and cracking, and the canoe may be finished with one or more coats of good oil paint in the desired color. For an extra smooth finish the waterproofing and filling coats should be sandpapered before applying the finishing coat or coats.

—953—

Water and Mildew Proof Compound for Canvas Tents.

The simplest way to accomplish this is to soak good animal glue in twice its weight of water over night, say one pound of glue in one quart of water, then melt the glue in the usual way by heating in a double kettle or boiler, adding enough water to make it fairly liquid, but not too thin. Have the canvas stretched on a frame ready to apply the following mixture before it has time to set, with a suitable brush:—Take as much by weight of chrome alum, as you have of sheet glue in the glue solution and dissolve it in sufficient hot water to take up all of the alum. Stir the glue solution while pouring the alum solution into it and apply the mixture to the canvas, as stated above. It is best to apply the solution to the canvas twice, but a new batch must be made for the second coat, because the mixture solidifies quickly and cannot be redissolved. The chrome alum renders the glue waterproof and at the same time prevents mildew, and the treatment permits the canvas to remain flexible.

—954—

Coloring (or Painting) Muslin Dark Green.

If muslin is sized, color must not be brittle or too rapid in drying, therefore use dark chrome green or bronze green of the shade desired, ground fairly stiff in linseed oil; add a mixture of coach japan and rubbing varnish, equal parts, enough to produce a semi-paste, and thin with turpentine for good work. Before applying the color moisten or dampen the muslin. For cheap work, mix oil color with a benzine varnish and benzine drier in equal parts and thin with

benzine, but do not moisten the cloth in this case. Do not have your color too oily and do not use oil in thinning the paint, if good work is desired.

—955—

Waterproofing Cloth and Canvas of Various Kinds.

For the tops of arctic shoes dissolve 4 ounces powdered alum, 4 ounces of sugar, in 3 gallons of water, and stir the solution twice daily for two days. When well settled, pour off the clear liquid and add to it 2 drachms isinglass, which has been dissolved in hot water. Keep the cloth of the shoes in this solution for six hours, after which hang up to dry, but do not wring. This will serve equally well for any woolen cloth.

To waterproof canvas or muslin dissolve soft soap in hot water and add a solution of iron sulphate (green copperas). The sulphate combines with the potash in the soap and the iron is precipitated with the fatty acid as an insoluble iron soap, which is washed and dried and then mixed with linseed oil. This will keep the canvas from becoming hard and from cracking, and water has no effect upon it.

—956—

Painting Canvas on Roof of Cabin of Boat.

Writer would like to know of a mixture for painting the canvas on the roof of the cabin of a boat. He has been told that ordinary paint burns the canvas.

That paint rots or burns canvas is a claim that can only be substantiated when the paint is of the most inferior character, such as is made from rosin and benzine or other cheap material that lacks elasticity and makes the texture of the canvas very brittle. When canvas is laid on decks of boats, on car roofs or on veranda roofs, the rule is to coat the wooden surface with a heavy coat of paint, made of pure white lead in oil, that may be tinted more or less with lampblack or yellow ocher or oxide of iron red; the canvas, after being dampened with water, is laid thereon, smoothed down, and, while still moist, it is coated over with pure white lead paint in linseed oil and little drier and tinted with a suitable oil color to produce the desired color. This will last for years.

—957—

To Letter on Muslin or Canvas Without Spreading.

Stretch the muslin or canvas and dampen it. Do not have any oil in your paint besides that which it is ground in. Mix it with two parts varnish and one part coach japan, and thin it with turpentine until it works well.

—958—

Priming Coat for Large Paintings on Canvas.

The first principle is to prepare the canvas with a ground or priming, which is made as follows:—Mix four pounds of powdered chalk or bolted English cliff-stone paris white to a soft paste in water, beating it until all lumps that may form have disappeared. If necessary, run the paste through a paint strainer. Then dissolve separately in boiling hot water two pounds of glue and one and one-half pounds alum. First stir the glue solution into the chalk paste, and when well mixed, the alum solution, while both are still hot. Have your canvas stretched on a frame and coat it with the mass while still hot, otherwise you will have to warm it. If too stout to work out freely with a four-inch wall brush, add enough hot water to spread smoothly. When this coating has set, but not let dried, give a coat of pure white lead in oil mixed with bodied boiled linseed oil, to which a small portion, say 5 per cent. of the weight of litharge in powdered form is added, the whole mass thinned with enough gum spirits of turpentine to make it workable under the brush. The ground so prepared will neither crack nor peel, but must not be painted on until thoroughly dry. The idea of adding such a large proportion of alum to the chalk and glue mixture is to toughen the glue into a jelly.

WALL PAPER AND DECORATIONS.

—959—

Little Things in Paper Hanging.

The little items in paper hanging attended to carefully, make a workman's reputation and destroy it if neglected.

Two things are essential to good work, neatness and thoroughness.

Neatness compels the paper hanger to keep all pasted scraps, trimmings, etc., in a box, used for that purpose, and kept under his pasting table or in any convenient place.

Nothing is so untidy or unworkmanlike as a man rushing around through a sea of pasted scraps with a long trailing line of margin trimmings hanging to each foot.

At the corners of the room, where ceiling and walls unite, is a place where bad work may sometimes be seen.

At these points the same piece of paper dropping slightly on two walls at right angles has to be cut out or a wad of crushed, wrinkled paper is the result, ruining an otherwise nice job.

Corner blocks, where used in baseboards at corners of rooms, require careful trimming of the paper, to avoid the ragged, haggled effect so often noticed in slop work. Also the turned corner pieces used to protect projecting chimney angles, etc., demand careful work.

Pasting is one of the arts in paper hanging. This may sound odd, but is true, nevertheless. It requires "eternal vigilance" to always be thorough and neat. If the paste is pressed back carefully by running the ball of the hand along the edge of the pasted, folded paper before using trimmer or shears, there need be no wriggly smears of paste at the laps or joints.

A point often neglected or passed by as unimportant is seeing that every piece of paper is evenly and perfectly pasted. The curled down dog's ear effect at tops of pieces, before border is put on, and ends of ceiling pieces curling up on the wall make nice work in hanging border difficult, to say the least.

But thorough pasting and all the other good work you may have accomplished up to this stage of the work, will be neutralized by a little carelessness or forgetfulness in failing to smooth down the paper perfectly after trimming at baseboards, window sills, corner blocks, etc.

And, in conclusion, I wish to speak of a mistake often made in cheap work, and that is to leave the spaces above and below windows and above doors until all full pieces are rung and then try to match in the pieces. Of course one side will be all right, but the other side will always be mismatched and ruin the job.

Lane Trew.

—960—

Neat Workmanship.

It is absolutely necessary for a paperhanger to be careful and tidy about his work if he desires to accomplish the best results and thinks more of quality than quantity. There are a few general rules which I would like to suggest to workmen who are desirous of perfecting themselves along these lines. First of all, do not leave the cuttings of the paper lying all over the room, as is the habit of the ordinary and careless workman. It is just as easy to roll up the waste cuttings with the pasted side rolled in and throw them in a heap under the pasting table as it is to drop them on the floor all around the room with the pasted side up, where they are lying in wait for the unwary to either step on and slip up on the wet paste or to be picked up on the soles of the shoes in an aggravating way, or perchance stick to the floor when they fall with the pasted side to the floor. This condition of things will cause the housekeeper to bless (?) the paperhanger when these odd pieces of paper have to be scraped off with a knife before the floor can be made clean. Another very important item is that

the paper hanger should always wear clean overalls and use clean tools. The overalls can be kept clean by the workman getting into the habit of rubbing his hands on a piece of cheesecloth or muslin which is conveniently placed not only for this, but to occasionally wipe off his scissors before the paste and color get hard and also to wipe off the baseboard after the bottom selvage of the paper is cut off. A pail of water should also be handy, to be used for the purpose of washing and cleaning the scissors before they become clogged. Nothing will ruin a pair of scissors more than attempting to cut with them when they are clogged with paste and color from the paper, and nothing will spoil the appearance of a job more thoroughly than a jagged and ragged trimming alongside of framework and above baseboards. All sweep brushes and scissors should be thoroughly washed at the close of every day's work. They will not only do better work when thus treated but will last much longer than usual. The average reader may think that these are old womanish notions, but in the writer's opinion they are absolutely necessary to look after if good work is the desired result.

R. N. Hunter.

—961—

Cutting Paper at Bottom.

When cutting the paper at the bottom and in order to get it to fit perfectly into all of the unevenness of the wall, I have found it to be a good plan to run a line along the top of the baseboard with a soft black lead pencil, then when the paper is pressed into the crevice between the baseboard and the wall it will be found by turning up the paper that there will be a clear mark on the pasted side which will act as a good guide to cut the paper by, whereby it will fit perfectly.

R. N. Hunter.

—962—

Need for Care at Corners or Angles.

The paperhanger should be just as careful in making the joint in the corner or angle of the room as he is on the plain surface, but it frequently occurs that this part of the work is treated very carelessly and little or no attention is paid to the correct matching of the pattern and more often than not the paper is apt to get very badly wrinkled either from being turned around the corner without cutting in the angle or else lapped to such an extent that it will curl up and wrinkle just as bad as it would if it hadn't been cut at all, but just turned.

R. N. Hunter.

—963—

To Correct Imperfect Matching of Paper.

Complaint is often made by paperhangers that the papers are imperfectly made and that they do not match perfectly. In many instances this is true, but my advice is to overcome this as follows:—Do not devote much time to matching the paper on the upper part of the wall, but spend all of the time and care to seeing that it matches as nearly perfect as possible on the lower part of the wall, or where it is opposite the eye. If it is perfectly matched at this point the slight difference in the design at the top will never be noticed.

R. N. Hunter.

—964—

Defects in Wall Paper.

Why do plain papers show a difference in the coloring along the edge, a defect which is of very common occurrence, and which cannot be discovered until after the paper is applied to the wall and thoroughly dried out?

We do not know the exact reason for this defect, but suspect it is due to uneven pressure of the machinery used in the manufacture of the paper, which

leaves one side of the paper a slight degree heavier in weight and coarser in texture. The only way to prevent this from showing is to hang every second breadth of the paper upside down; this will bring the two dark sides together and will therefore disguise the defect. This defect is also to be seen in smaller checked designs, which are made to imitate fabrics, such as burlaps and buckrams. The trouble in this case is due to the intersection of the small lines, which, in some cases, is slightly heavier on one side than on the other. This can be overcome by trimming off more of the paper than is usual.

R. N. Hunter.

—965—

Differences in Shade of Plain Colored Papers.

Difficulties were found with the shading of plain papers, and the inquirer wanted to know how to overcome the trouble. In most cases the differences can be detected by a careful examination and comparison of the various rolls. In this way it will be found possible to detect most of the differences, and by placing the different shades in different parts of the room the differences will not be noticeable. Aside from this, it will be well to reverse every other breadth, because sometimes the paper is a little darker on one side than on the other, and therefore by reversing you bring the sides together which will match. When this care in selection and placing fails to produce results that are satisfactory, it will be necessary to appeal to the manufacturer for better goods.

R. N. Hunter.

—966—

Economical Cutting of Wall Paper.

It is remarkable how few paperhangers know how to cut paper to advantage. Their failure to do so is due entirely to the fact that they do not study



No. 1.

the designs of the various papers they are constantly handling. For instance, in the paper here illustrated, Figure A, the pattern is sixteen inches in length. A pattern and a half is therefore twenty-four inches, as shown in Figure B. By closely studying this pattern it will be noticed that where the half pattern meets the centre of the paper in its width it meets a figure exactly similar to the figure at the side, and as there are many patterns of a similar construction it is possible, by proper handling, to cut the paper to good advantage, whereas it may seem at first glance that it will be cut to waste. For instance, we will say that is desirable to cut up about twenty lengths of this paper, each length to be twenty-four inches long. Now there are many men in the trade who would immediately proceed to cut each piece thirty-two inches in length, which is equivalent to two blocks (one block not being long enough) thereby having a waste of eight inches to every length, which would be equivalent to ninety-six



No. 2.

inches waste in every roll. This waste can be entirely avoided by cutting the paper a pattern and a half in length, which will just bring it to the twenty-four inches. It will be found that when doing this that every other length will be cut at the half pattern, but by cutting ten in this manner and ten at the full pattern and placing all of the first kind in one pile and of the second kind in another pile, and designating the lot cut at the full pattern as lot No. 1 and at the half pattern as lot No. 2, the No. 1 lot can be hung first and then joining the No. 2 lot to it by simply splitting the first length directly in the centre, it will be seen that it will match perfectly. See Figure B. The balance of No. 2 lot will necessarily match up perfectly. This illustrates the advantage of careful considering the pattern before cutting it up.

—967—

Papering an Attic Room.

Almost every paperhanger has, at some time or other, been called upon to paper the walls of an attic room, which, on account of its slanting ceilings and

dormer windows, makes a difficult problem. Figure 1 shows the corner of such a room. A light paper with a small indefinite pattern which could be used on ceiling and walls alike is best. It is always up to the paperhanger to make the best of seemingly impossible things, such as, for instance, to hang stripe papers or large and prominent designs. The most perplexing problem is to

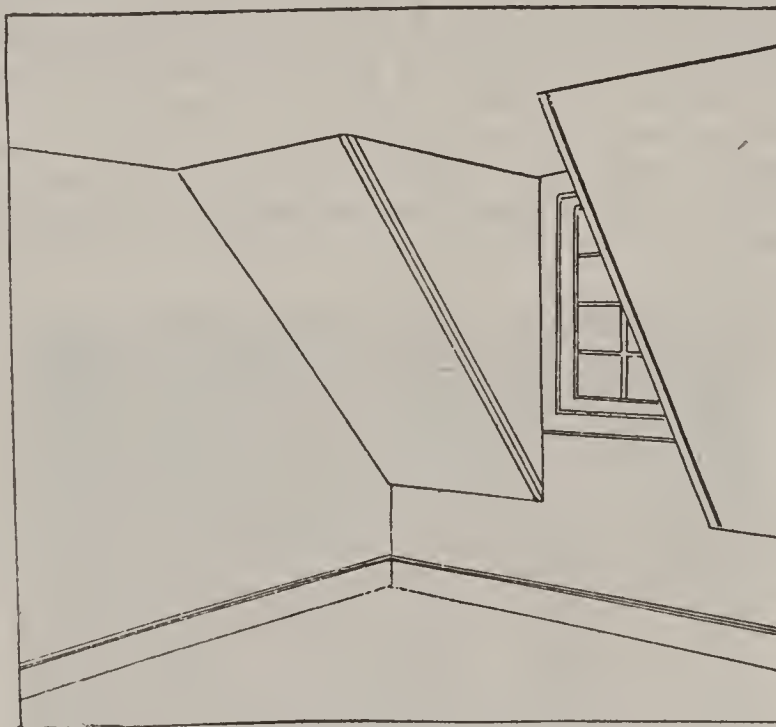


Figure 1.

decide where the ceiling begins and where it ends. A great many competent authorities claim that the slants (see B) are part of the ceiling, and there are as many who claim that they are part of the wall and should be papered with the wall paper and not with the ceiling paper. No matter how it is done, it is bound

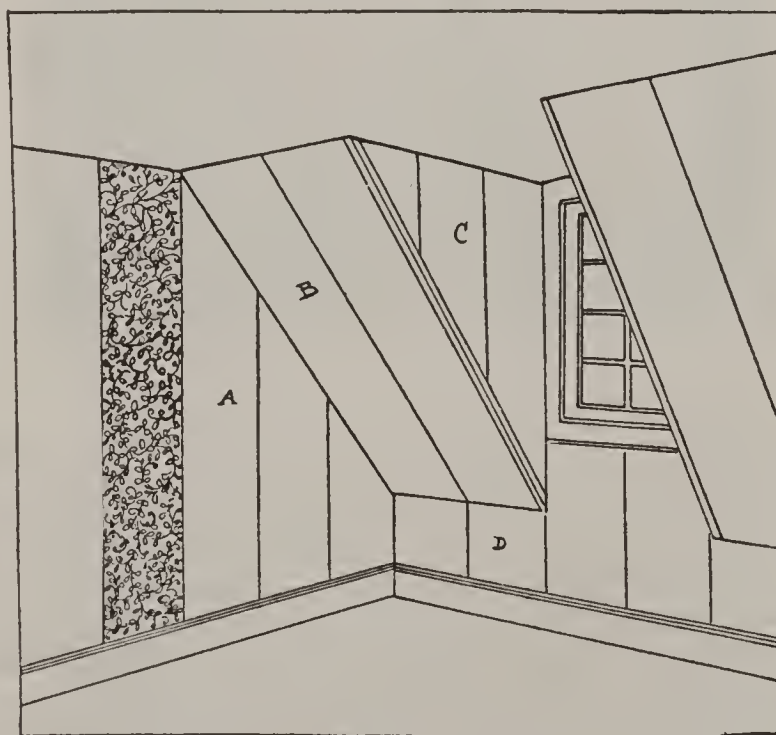


Figure 2.

to displease somebody. The writer has almost always found it advisable to consider it as part of the wall, and has found it to be very satisfactory, especially where he has had the opportunity to influence the selection of the papers. A striped paper should never be used on rooms of this character, nor should large or prominent designs. Close and rather small patterns are very useful, and as

these rooms are usually intended for bedrooms it should not be a very difficult matter to find papers suitable for this purpose.

The ceiling should be papered with a small, light and indefinite pattern, such as the little snowflake or moire patterns, and when hanging it should be hung across the width of the room, and not with the length, as is often done on square rooms. The first breadth to be hung should be the first long piece, where the slant joins the ceiling, the little recess from there to the window can be finished out with the short ends cut off of the rolls and after the larger part of the ceiling is completed. If the room is an old house and the ceilings and walls have been formerly limewashed, I would advise that the paper be slightly lapped, because if it is butted the seams will surely open, as it is next to impossible to ever get all of the old lime shells off of the plaster, and if this precaution is not taken small particles of lime will always be breaking the seams open. When papering the walls, I should start at the same point on the walls as I did on the ceiling with the ceiling paper (see Figure 2). I should be very careful, however, to hang it perfectly straight.

I should hang the first breadth of paper, as is shown in Figure 2, and I should then proceed to hang the small and odd-shaped breadths from there to the front wall, as shown in "A." When cutting these at the angle, I would let a small selvage lap over onto the slant (say about half an inch), making sure to push it into the angle tightly by running the back of the scissors close into the crevice of the angle and then dabbing it carefully and well with the smoothing brush. Then I should carry along the small breadths, as shown at "D," after which I would hang the two pieces on the slant, as shown at "B," matching them at the bottom of slant where it joins "D." Then, after filling in the cheeks of the window as at "C," I would proceed with all of the plain work in the back of the room, beginning at "A" and working from the front to rear. I would advise the use of moldings or small binders to finish these papers off at the top. It is sometimes possible to bring the ceiling paper down a little ways on the wall and then have a molding or small binder separate it from the wall paper. However, it is the experience of the writer that the simplest way is the best for rooms of this character, and for that reason he suggests the method first described.

R. N. Hunter.

—968—

Removing Old Paper Without Injury.

The question was asked if a fine old English paper can be successfully removed from one room and hung in another.

This is practically an impossible task, although we know of one instance, a good many years back, when one of our own customers (a lady) removed a paper from the wall of one room and employed us to put it on the walls of another room, which was a trifle smaller, but it must have been a long and tedious job, as she removed it, inch by inch, with an ordinary table knife, which, having a thin, sharp blade, she could push a little bit at a time under the paper. There is no doubt but what there are some papers of sufficient weight to stand this treatment, but we would not care to have the job.

R. N. Hunter.

—969—

Removing Tiled Paper from the Walls of a Bathroom.

A better way was wanted to remove tiled paper from the walls of a bathroom than simply washing it off with hot water.

The only other method than soaking the paper with hot water repeatedly and removing it with wall scrapers is to apply steam to the walls in order to loosen the paper, which is more effective than the soaking, but this is not always practicable, and if carelessly done may be the means of injuring the woodwork and its finish. An apparatus is manufactured by which paper is safely removed by means of steam. Other means of destroying paper are too expensive.

First remove the varnish from the paper with aqua ammonia, then soak the paper with warm or hot water in the usual manner. This will be difficult when Venice turpentine has been used in the paste, but a small quantity of ammonia in the warm water will facilitate work in such cases.

—970—

Preparation of Walls for Papering.

All walls should be properly prepared before being papered. How to prepare them depends first on what kind the walls are, and secondly what kind of paper is to be used. If the walls are just the bare plaster surface it will only be necessary to give it a coating of weak size. That is, if it is an ordinary paper which is to be used on it. If the paper is heavy or of a delicate texture the walls should be first prepared with a plain lining paper. If the walls are old painted walls, in order to make the paste stick to the paint it will be necessary first to remove the gloss or oil finish to the paint. This can be done in various ways. First give them a scratch of sandpaper and then a coat of molasses size. Another way is to wash the walls over with a weak solution of soda and water which should afterwards be washed down with vinegar. Great care should be taken when using this solution of soda that it is not allowed to touch the paint or varnish on the woodwork. Another size can be made with a mixture of whiting, size and plaster. It is possible, however, to procure very good preparations which contain the best of all of these ingredients in a uniformly equal quantity. This size, like the patent paste which is now on the market, comes in a powdered form and can be prepared, ready for use, by the addition of water according to simple directions, thus making a good and ready article convenient for use at all times.

R. N. Hunter.

—971—

Papering Walls for Paper Hanging.

We were asked to explain the cause of pressed wall paper curling up from the wall and pulling the lining paper away with it.

The answer is very simple. This, like many other troubles of the paperhanger, can be laid to the common habit of using your paste too thin. Many men in the trade fail to use discretion in the important matter of pasting various kinds of paper. Because the lining paper is thin and of light weight does not say that the paste should be like water. The fact that a heavy paper is going to be hung upon it makes it necessary to use the paste heavy enough to carry not only the lining paper but also the pressed paper. This is probably the trouble in your case, except it might be that the wall was not properly cleaned before the lining paper was applied. This is very frequently the cause of trouble. A paperhanger should be very careful to examine a wall closely to determine whether or not there is paint or varnish which should be taken off before the new paper is applied. I have frequently seen where the new paper has pulled off the old paint, which with ordinary paper might be all right, but when using a heavy grade of paper the paint would scale right off in flakes and make it difficult to fasten back. In other cases, after having washed off a kalsomined wall which had been previously varnished, it is never safe to paper over this surface except with the very cheapest grade of paper. It is absolutely necessary to remove varnish from a wall before papering, and it can be done with ammonia or soda, or with any of the standard varnish removers, but I always use a mixture of fresh slaked lime and soda dissolved in hot water. Apply this with an old stump of a brush and scrape off with an ordinary scraper, keeping a pail handy to catch the scrapings. It is well, also, to use old gloves to protect the hands. After the entire surface is so scraped, it can be washed off with water and vinegar mixed. This is, of course, a disagreeable method, and rather mussy, but it will be found effective when other methods fail, and is especially effective for ceiling work. The one thing to remember is that there must be no old kalsomine or dust on

the wall before papering, and when lining the wall always use the paste heavy enough to carry both the lining paper and wall paper. Another error of many paperhangers is in using the glue size too strong. When the size is too strong it has a tendency to peel or curl up, which will become exceedingly exaggerated when the paste and paper come into contact with it. Better to have a well washed and cleaned wall with no size than a wall with size too strong.

R. N. Hunter

—972—

Papering a Smooth or Oiled Wall.

There need not be any special preparation for walls that are very smooth, oiled or painted, but a different kind of paste is required from the ordinary. This paste is recommended for walls of that description: Mix in sufficient cold water to make a stiff batter, four pounds sifted wheat flour, beat out all lumps, then add more cold water until it assumes the consistency of pudding batter. Then pour in boiling water, slowly at first, then faster, stirring meanwhile, until the paste swells and thickens. When it has assumed a darker color it is cooked sufficiently. Do not use alum in this paste, but add one ounce of finely powdered rosin for each gallon of the thinned paste. Set it on the fire and stir it until it boils and the rosin is melted. When cool, thin down with a weak solution of gum arabic, one ounce gum to one-half gallon water. On pasting, have the paste on as thin as possible, just enough to make the paper adhere.

—973—

To Prepare a Painted Wall for Papering.

The joints of the wall paper will open on a painted wall. There's only one correct way to prepare a painted wall for papering, and that is to give it a good coat of potash, or a strong washing powder solution, and then wash it off with clear water. Some paperhangers think they accomplish the same purpose by putting potash in the size, but its a' dangerous practice because it is very apt to change the color of some of the more delicate tints, or of blues and other colors that are affected by alkalies.

The Veteran Painter.

—974—

Papering a Varnished Wall for Papering.

A paperhanger asked how to prepare a wall for papering which had been previously varnished as a preparation for tinting.

In answer, it is necessary to remove the varnish with paint and varnish remover. It has been the experience of the writer that there are many men engaged in this business who, from motives of dishonesty, which sometimes masquerades as extreme "business shrewdness" or lamentable ignorance, cover everything with ceiling varnish rather than reach or scrape off the old stuff. Frequently one will come across a case where the difficulties are increased by having to contend with a coat of shellac sandwiched in between the various old coats of paint, size and kalsomine for, let it be known, there are innumerable ways of doing this wrong and only one way of doing them right.

The cleanest way for all conditions where only the ceiling varnish has been used it to use, as we have said, some of the excellent liquid varnish removers now offered for sale. These can be applied with a brush and the varnish can be washed off with a sponge without injury to the hands or brushes. The danger that one is liable to if the varnish is not removed is not that the paper will loosen from the varnish, but that the action of the paste and paper on the varnish will cause the varnish to chip and flake off the wall and carry the paper with it.

R. N. Hunter.

—975—

Papering Walls That Are Plastered on Stone and Rather Moist.

An inquirer had a room to finish which was plastered on stone walls, and as there had been some trouble with moisture coming through the walls, asked our opinion as to the proper treatment, the owner preferring to have them papered.

It is a difficult matter to prepare damp walls so that paper will adhere to them permanently. It is necessary to first heat and ventilate such rooms so that the inner walls become perfectly dry and then to cover the walls with lead foil or tin foil, but even then it is possible that the defects are removed only temporarily, because of the absorption of moisture by the stone and mortar. The best method, though not an infallible one, is to put thin laths on the wall and stretch strong felt paper on them, so as to allow ventilation between the paper and the wall, but there must be a free circulation of air, or even this expedient will prove futile. The only sure remedy would be to remove the rough plaster of the walls on the exterior, after the moisture has been driven off the interior of the room. Sometimes moisture comes from defective roofs, gutters or waterpipes, which can be cured by repairing the leaks.

—976—

Hanging Wall Paper on Muslin

While, in the writer's opinion, wall paper pasted to muslin over a board partition falls far short of being the best that can be done, it is possible to apply it in such a manner that it will make a fairly permanent job. Most of the trouble with muslin and canvas work is due to the lack of knowledge and experience. Many paperhangers fail to take into consideration the fact that a piece of muslin big enough to cover an entire ceiling or sidewall makes a very great weight to depend upon a few tacks, the result of this ignorance being that the great weight of muslin, size, paste and paper will cause a great strain on the tacks and in many cases it will rip and come down with a rush at the most unexpected moment. If this does not occur, it will undoubtedly loosen up somewhere and cause a huge wrinkle to show from one corner of the wall to another. The common method of hanging muslin is to tack it all around the outside edge with one row of tacks. After this is done the muslin is then stretched or shrunk by being moistened with water, and sized with a weak coat of glue size and then papered. In the writer's opinion this is a very faulty method. There should be a double row of tacks all around the outside edge of the muslin and besides that it should be tacked all throughout the center of the ceiling or wall, see illustration. This method of tacking confines the weight of the muslin, etc., to a small area and reduces it to a minimum. In this connection let me caution the paperhanger against using the ordinary cut tacks, as from experience I have found that they rust out and cause the muslin to break away from the tacks on that account. It will be found that tinned tacks will last very much longer and will prove more satisfactory on that account.

R. N. Hunter.

—977—

Proper Method of Hanging Unbleached Muslin.

Some paperhangers say that the only way to hang muslin is to tack it up in narrow strips, paste down the edges and size over the whole of the surface before papering, and yet again other paperhangers say that it is proper to paste the muslin before papering. Some say that the muslin should be soaked in a pail of water before being stretched upon the wall. I have found these methods all to be faulty. The method which I have found to be thoroughly satisfactory is as follows: Measure the surface to be covered and have the muslin sewed up so as to make one piece big enough to cover the entire surface. Have the seamstress

make the seams at least a half inch in width and be sure to instruct her to press the seams down with an iron after all seams are sewed up. When hanging the muslin make sure that the seams are turned in toward the wall and not outwards, or they will show through the paper. When you are ready to hang the muslin erect a scaffold consisting of two steps and a plank. Tack muslin all along the top, then stretch it to the bottom, but be careful not to stretch too tight, just enough to remove the wrinkles. Then tack the side, by taking first the left side and then top in exactly the same manner as when handling the top and bottom. After this tack all through the center of the muslin. After the tacking and trimming is all completed the whole surface should be gone over with clean water, which can be applied with a large brush like a kalsomine brush, commencing at the top and working downwards. While the muslin is still wet all of the edges should be pasted down, which can be done by simply dipping a sash tool into the paste and running the brush along the edges, it being necessary to lift up the muslin as the paste will go through the mesh.

When the muslin is all dry it will be found that it will have stretched good and tight, and will be found to be a good surface to hang the paper on. When hanging the paper on muslin it should be lapped at least one-quarter of an inch in width. Many paperhangers make the mistake of attempting to make a butt joint, which it is practically impossible to make perfect, except by previously having papered with lining paper, which, after being dry, is a good surface to butt on, providing the lining paper is tough and strong. For all fine grades of papers and materials like grass cloth, it will always be advisable to first hang lining paper.

R. N. Hunter.

—978—

Papering on Cloth.

For the benefit of those that have never had much papering on cloth to do, I will give my idea as to the best way to cloth a wall that is ceiled or shiplapped inside, as a great many houses in the West are finished in this way.

The house to be clothed and papered should be done before the inside casings and base boards are put on. The ceiling is started first. Never cut cloth from bolt first, but start next the wall and run a row of tacks across one end, about three inches apart; then run down the side next the wall. Be sure and tack in the selvedge, as if you don't the edge will turn up when you stretch it. When this side is finished then tack the other end, stretching some. Now you have the other edge to stretch the whole piece; the tacks do not need to be so close together, as the next piece will cover this edge and tack through it. When this piece is on you should put on shower tacks, running about one foot from the wall; put in three tacks across, dividing space equally, then one foot farther two tacks, so as to come between first spaces, and so on the entire length. We generally figure two and one-half to three pounds to the one hundred yards of cloth of four ounce tacks, unless the wood is very soft, like cedar, then use six ounce tacks. When you cloth the wall start in the corner and always work away from the corners. Don't double your cloth in the corners, as it will not make a square corner when you have finished clothing. Always remember to be sure and cloth in the selvedge, if you don't the edge will turn and show through the paper when finished. Now, if you have everything covered, take some heavy paper, say ingrain, and some good paste. Paste a strip, using plenty of paste, fold and cut into strips four inches wide and run in all the corners, and using a good stiff dry brush, pound till the corner is perfectly square. Then when dry hang paper same as on plaster, but you cannot do butt work, as it will draw apart at joints. One thing you should be sure not to let happen is to let the paste stick the cloth to the wall, as it will be sure to crack the paper. Use a 22-inch cloth and you will have no trouble to have a nice job when finished.

William Reid, Tuscon, Ariz.

—979—

Hanging and Preparing Muslin.

The proper method of applying prepared muslin to an old wall or ceiling to be afterwards painted was wanted.

After thoroughly cleaning off the surface of the ceiling or wall to be covered with canvas, apply a coat of glue size, after which apply the paste to the wall direct, then brush the muslin to the wall over the wet paste, rubbing energetically and thoroughly with an ordinary stiff paperhanger's sweep brush. If the muslin is in narrow widths and it is necessary to make a joint, lap over about two inches and by placing a straight edge firmly against lap, cut through both thicknesses at once; then by removing the cuttings a perfect joint will result. When the muslin and paste have thoroughly dried give the entire muslin surface a coat of thin relief compound, which can be purchased in dry form especially prepared, or can be made as follows: Prepare a pail of strong sized kalsomine, to which add about 4 spoonfuls of molasses and about half the quantity of ceiling varnish. Sprinkle into this mixture about two handfuls of plaster. This mixture after being thoroughly stirred up should be thinned down with alum water, which is made by adding a handful of pulverized alum to half a gallon of water. Do not put either the alum or plaster in until you are ready to apply the mixture.

After giving the surface of the muslin one coat of this mixture fill up any opening in joints by applying thick relief compound when the filler is almost dry. This method of filling up the joints before the coat is thoroughly dry results in both the primer and joint filler drying together without any lap. A second coating of thin relief compound is applied after the first coat is thoroughly dry. This second coat can be made heavy and supplied rough if it is desired. There will be no danger whatever of either the glue or muslin coming from the wall, as the experience of the writer has determined that it takes an everlasting hold, and in many cases where the effort has been made to remove the muslin it could not be accomplished without ruining the outside coat of plaster.

After these two coats of relief compound the walls can then be painted in the usual way, and with most satisfactory results. Most unusual effects can be obtained through this method, which are quite impossible by any other.

It is possible to avoid a great deal of trouble and effect a great saving of time by purchasing specially prepared canvas, which can be very readily procured. It comes in all widths sufficient for all purposes, is well fitted and sized, can be very readily handled and only needs painting after being applied. It is also possible to make good work with opaque shade cloth, which can be applied as readily as paper.

R. N. Hunter..

—980—

Hanging and Sizing Muslin to Be Painted.

How can muslin be hung, so that the seams will not show and how should muslin be sized, before oil paint is applied?

Measure the blank spaces of the wall and have your muslin sewed together, then trim the pieces to proper size, stretch on frames and give it a coat of glue and alum size. Use only one ounce of alum to one-half gallon of glue size. Put the muslin in its place, using tacks with tinned heads and tack only at edges, to which flour paste is applied one inch in width. For first coating the muslin use white lead, thinned with two parts raw linseed oil and one part of turps and liquid drier. Have the paint stout and rub out well. Follow this coat when dry with any suitable paint.

—981—

Applying Canvas on Walls and Painting After Application.

How is paste prepared for use in canvassing walls? Should paste be applied to both canvas and walls, and should edge be trimmed before hanging or during the operation? How should canvas be treated to make a good flat finish in five coats?

To hang canvas on hard finished walls the latter must be glue sized, using one pound of good glue to six quarts of water. It is best to have the size fairly warm when applying it. The paste must be good and stiff and is greatly improved by adding two tablespoonfuls of Venice turpentine or Canada balsam to a pail of paste while it is warm. If the paste is cold, warm it and stir the balsam. Trim and butt the edges of the canvas before hanging and apply the paste to the wall, but also paste the edges, roll down the joints with care and immediately sponge off with clean water, so that no trace of paste is left on the surface. When the goods are on the wall they are ready for painting as soon as the paste has thoroughly dried. The painting should be done in pretty much the same manner as a plastered wall, white lead and linseed oil with very little drier for first coat, white lead and equal parts linseed oil and turpentine for second coat, tinted, if desired, same color as the finish. Succeeding coats may be composed of lead or zinc in oil, thinned so as to dry flat on the last coat. Glue size should not be used at any stage in painting canvas covered walls.

—982—

Applying Canvas to Wall.

Our process of applying muslin, or canvas as it is sometimes termed, is pure and simple hand work. We do not use a brush to paste nor a paperhanger's brush to smooth out the material on the wall.

Ten-quarter heavy unbleached muslin is used, which is seven to seven and a half feet in width. The selvage is ripped off, for if left on it will show ridges in your work. It is then soaked in a wooden tub of paste with a board with a hole in it nailed to the tub, in strips the length of the width of the room.

The muslin is then drawn up through the knot hole, which removes all the loose paste. When the muslin thus soaked is placed on the ceiling it is thoroughly scraped and rescraped with broad knives and painters' scrapers until all superfluous paste is removed.

When dry, all blisters, stains and extraordinary cracking of the plaster and mottling of painted walls often seen, caused by the improper gauging of the plaster, is eliminated forever and nothing can dislodge or disturb the canvas so treated.

Burlap, both the lining and dyed, should be thoroughly worked onto the walls with the hands. After applying the paste first to the walls and then to the burlap, if thoroughly worked out with the hands, not using a brush to smooth it out, it wall stay put.

R. Pedretti, Cincinnati.

—983—

Covering Ceiling with Shade Cloth.

The preparation of a ceiling or wall, where paint is used is the most important part of the work, as a badly filled crack will simply ruin the appearance of the very finest flatted work. In consequence of those same cracks, I have often advised covering the ceiling or wall, first with shade cloth, or cotton cloth, which is quicker and more easily applied, first sizing the ceiling with a good size glue. The method of applying the shade cloth to the ceiling may not be uninteresting.

Each length is cut and pasted, on the floor, as it is required. The paste must be very stiff, made of the best flour, with a little alum added, and to each pail it is desirable to add also one tablespoonful of Venice turpentine while the paste is hot.

After pasting, the cloth is put up loosely on the ceiling, just enough to hold it in place. Then, taking a broad stripping knife, begin laying the cloth from the centre and working the paste out gradually to the edges. All surplus paste must be squeezed out, as any thick pieces left will look like a blister and have to be cut out next day. The second length is applied the first and the edge allowed to lap well over the other, so that both edges may be cut at once with the straight

edge and knife. This being done, the joints, relaid, will be found to fit perfectly, and nothing will be required in the way of puttying. After each length is in place, it should be carefully gone over with a sponge and clean water to clean off all paste and make equal drying all over. Then the painting can be proceeded with.

Wm. Davenport, Port Loma, Cal.

—984—

Transparent Varnish for Wall Paper.

A washable transparent varnish for white tile paper and other white papers is prepared by boiling in an enameled kettle, under constant agitation, one pound refined borax and one pound gum sandarac in one gallon of clear water, until all the borax and gum are dissolved. The solution is then strained through fine muslin or cheese-cloth and allowed to cool and clear, when it is applied to the paper before or after hanging. Two applications are required, permitting the first coat to thoroughly harden before applying the second. It should be applied with a wide soft brush and when the second coat has thoroughly dried, the surface should be gone over with a soft brush briskly, which will impart a very fine lustre. For dark wall papers gum shellac of the pale sort may be used in place of sandarac. This surface may be washed down with soap and water from time to time without injury. Silicate of soda or waterglass is also suitable for the purpose, and much more economical, though not quite so durable as the varnish made by the above formula. It comes into commerce in the consistency of heavy syrup and for first coating should be thinned with its own volume of water, while for second coat it should be applied in its regular commercial consistency. It dries out hard as glass itself with good gloss, and may be cleaned when soiled with a sponge dampened with lukewarm water. Soluble glass or water glass is prepared by fusing in a crucible 15 parts of silica, 10 parts of carbonate of soda or potash and one part of charcoal. When the fused mass has cooled, it is pulverized and exposed to the air. The powder is afterwards washed in cold water, then boiled in 5 parts of its weight of water until dissolved and finally strained and evaporated to commercial consistency. Its price is very moderate.

—985—

Hanging Heavy Embossed Papers.

For pressed or embossed papers, the walls should be carefully prepared and to make a good job should be first lined with lining paper. The paper should be hung with a stiff paste and trimmed with knife and straight edge or trimmer and straight edge after pasting. In trimming the paper, be careful to lay the straight edge upon the selvage or portion of the paper to be cut off, and not upon the painted or embossed surface. Both edges must be trimmed close and very true so that a perfect butt joint can be made. Although two or three breadths may be pasted before hanging, as a rule it is better to hang each breadth as soon as pasted, and not to use a roller, but use a soft brush to press the paper into position. It is well to add Venice turpentine to the paste in the proportion of four teaspoonfuls of Venice turpentine to four pounds of flour.

—986—

Hanging Crepe Paper.

Size the wall with weak glue size, trim your paper, while dry, before pasting, with knife and straight edge, and on pasting use a round brush, and take extra care not to run your paste too heavy near the edges, and hang each piece as soon as pasted, so as not to allow the paper to become too limp. Follow the same methods as you would in hanging pressed or embossed papers, and use your paste just as heavy as you would in the latter case. The roller, of course, cannot be used, and great care must be exercised in the use of the brush. Use the ordinary rye flour or wheat flour paste, but have it stouter for ordinary paper, and, above all, have it free from lumps.

—987—

Hanging Eltonbury Silk.

“Eltonbury Silk” should never be hung with any other than fresh home-made paste and should always be lined with regular white lining paper. That is to say, the walls should be properly prepared with size and then covered with white lining paper before the Eltonbury silk paper is applied. The paste should not be too thick and should be applied to the paper smoothly and evenly. There should be no lumps. After the paper is pasted it should be trimmed and applied to the wall as quickly as possible. It should not be allowed to soak, as it will if allowed to remain unhung until two or three lengths are pasted, as is often done with more ordinary paper. Another thing to take note of is that there should be no alum or other foreign matter in the paste. The paste should be made of the best wheat flour obtainable. The method of making is as follows:—Beat up a quantity of flour (which has been carefully sifted through a fine sifter) with lukewarm water until it is perfectly smooth and free from lumps. Don’t make it thin and watery, but have it of the consistency of heavy molasses. When it is finally beaten up to that condition (entirely free from lumps and perfectly smooth) pour onto it water which has been brought to a boiling point so that it is scalding hot in the following manner:—With the left hand stir up the flour with the end of a broomstick or long wooden spoon, and with the right hand pour from a kettle the hot water slowly and steadily, while at the same time the left hand is slowly and steadily stirring the flour. Keep this up until the paste thickens, which it will do and will form into a jelly-like state. When it has reached this state set it aside to cool, but before doing so pour a little cold water over the top of the paste to prevent it from forming a crust.

R. N. Hunter.

—988—

Painting Lincrusta Walton or Heavy Embossed Paper.

A relief material with highly raised figures was to be painted, the ground to be green and the raised work to be cream color.

In the first place, the material must be sized, which you can do with either shellac varnish or with glue size, according to the pay you obtain for the work, shellac being best. Apply your cream color first all over, then cut in your background with green color.

—989—

Proper Method of Hanging Buckram.

The process employed by one of the most prominent firms of decorators in the country is as follows:—First, size the walls with the ordinary paperhangers’ size. Next cut the buckram, which looks like a very easy matter, but great care must be exercised in cutting the edges straight and so that they will match perfectly, which must be done with a sharp knife and “true” straight edge. Then hang the sheets of buckram as you would ordinary wall paper, using flour paste to which some liquid glue has been added. After the strips or sheets have been hung properly, tack down the edges to prevent curling.

In buckram or burlap hangings the decorator has an unlimited field for rich and varied effects and designs. Any stain or water color will serve for certain effects, but before the color is laid on a design should be prepared, so that any first-class journeyman can do the work, without requiring the services of a first-class decorator. There are plenty of other combinations and contrasts that can be utilized on these hangings, or the bare buckram may be paneled by placing moldings over the edges and stencil designs can be worked into the panels.

—990—

How to Hang Burlap.

Ordinary flour paste, used heavy, is all that is necessary to hang burlap with. As all grades of burlap are now made with a specially prepared backing, they can be pasted with a brush in the same manner as wall paper. It frequently happens, however, that it is necessary to paste the wall and then roll the burlap onto it. It will be necessary to follow this plan when the burlap is wider than thirty-six inches. It is done in the following manner:—The wall is first prepared with sizing, after having all old kalsomine or wall paper removed. It is then covered with paste, which should, of course, be heavy enough to carry the weight of the burlaps. The material is then cut a trifle larger than the space and then put on a roller or stick the length of the material's width. Then, by starting at the top, it is unrolled onto the wall until the bottom is reached. It will then be necessary to start at the top again with a rather stiff smoothing brush, taking care to brush the material tight into the angles, cutting at top and bottom in the same manner as wall paper by creasing the material by running the back of the scissors' blade along the top of the baseboard and under the cornice moulding, thereby making a mark which will act as a guide to cut by. Great care must be taken that this cutting is done neatly and accurately, and it will be found to be a good plan to cut a little full rather than close. After cutting top and bottom, pound it down tight with the smoothing brush, making sure that the paste has not dried up, in which case it will be well to add a little more paste in these two places, just above the baseboard and under the cornice.

Where the material is not wide enough to cover an entire wall, and it is necessary to make a joint, proceed in the following manner:—In rolling the next piece of burlap onto the wall let it lap over the piece already hung about an inch and a half. Place a straight edge over the middle of this lap and cut through both thicknesses at once. It will then be easy to make a perfect joint; in fact, this is the only way that a perfect joint can be made with burlap.

R. N. Hunter.

—991—

Hanging Burlap Over Kalsomine.

When the cost of the material and the labor are counted and it is considered that these will be thrown away if the kalsomine fails to hold, it is very poor advice to even consider putting on burlap without washing off any kalsomine that may be on

S. C. Singleton, Jr., Wilmington, Del.

—992—

Hanging Burlaps on Wood Partitions.

We were asked how to hang burlaps on walls made of rough boards covered with building paper. There is only one way to do this satisfactorily. Remove all old paper now on and stretch muslin over the surface, tacking it securely around the top, bottom and sides. Then on top of this stretch the burlaps. This may be done in two ways. The best way is to buy the burlaps wide enough to cover the walls without any seams. (It can be had up to 240 inches in width.) The tacks along the sides, top and bottom can be covered up with small beading, colored to match the burlaps, or with upholsterer's gimp. Or, if the ordinary width of burlaps is used, it can be stretched by tacking along the seams and covering the seams with small moldings painted to match the moldings. While this covering up of the seams is a necessity, it may be made a very ornamental feature by using the moldings in the form of paneling.

There is yet another way of putting burlaps on a board wall, as follows:—First cover the walls with muslin as above described, then shrink the muslin by wetting it with a sponge or brush, using nothing but clean water. Then cover the muslin (after it is entirely dry) with extra heavy paper, using paste in the

same manner as for wall paper. We have found that a light weight of building paper is excellent for this purpose. When this is dry and stretched tight the burlaps can be hung upon it in the same manner as on an ordinary wall, using paste as on wall paper, but it will be necessary to place a molding in the corner to prevent cracking of the lining paper.

R. N. Hunter.

—993—

Burlap on a Wooden Ceiling.

In the first place, I do not think a tongue and grooved surface of any kind can successfully be covered with any substance without the result of boards showing through either immediately after completion of the job or with age. Hence I have found that the first move is to paint all the surface. The next is to fill flush the grooves with roughstuff or a hard drying putty; this can be applied very coarsely with a broad knife or scraper, not heeding the irregularities of this compo, as when this substance is dry and hard and coarseness or irregularities can be rubbed smooth with coarse sandpaper. This rubbing off of surplus putty does not involve a great amount of time, providing this roughstuff has been properly prepared, so that the sandpaper can cut it off into dust.

Once all these grooves are filled, apply with a broad knife a thick coat of, say one-half oil putty and white lead to which has been added a small quantity of cheap varnish. This coating should be applied very freely and should be one-eighth of an inch thick, at least, after which cut the burlap to fit the panel and apply same by pressing it to the ceiling with the hands and the roller.

Of course, this process will not allow sized or prepared burlap to adhere, as the sizing on back of burlap would prevent the absorption of the coat of lead, but unprepared burlap or jute must necessarily be used.

It will be perceived that at this stage the white lead has necessarily made its outside appearance through the burlap, after which this burlap can be treated in either distemper or paint finish.

The above process is a costly one, and I would hesitate to bid much less than one dollar per square yard, to finish the same in paint, in one color and for a reasonable quantity, but I believe that burlap applied in this way will never bulb up or loosen, but, of course, I am not prepared to say that it will keep the building from twisting. I do think that it should be some considerable protection against dampness affecting the woodwork to which it is stuck.

Experience has taught me that it is extremely difficult even to paste paper on a plastered wall and have it remain without loosening in course of time, hence one might hesitate to apply burlap with paste to a wooden ceiling, let alone the responsibility of the result through age.

J. N. Arcand, Montreal.

—994—

Painting Burlap.

A firm of painters put on some burlap, about five years before, which had become faded, and the owner wanted it painted in oil colors. The painters asked for instructions in the proper method of doing this.

First make sure to fasten back all loose corners and edges, as well as to trim off all loose threads which may have been roughened up by wear. Then give the whole of the surface a coat of ceiling varnish or other cheap and quick-drying varnish, after which give a coat of glue size. The surface will be then ready for painting, the same as any wall surface. According to what effect you want on the finish coat (whether it is to be a flat or glossy finish) will decide as to how you proceed. If the last coat is to be flat, the one preceding it should be glossy, and if the last coat is to be a gloss coat the one preceding it should be flat. A very good effect can be made by rubbing a thin glazing color over the flat coat. This effect will produce a fine transparent coloring which can be obtained in no other way and which gives to the burlap a very fine effect particularly suitable to the

fabric. For instance, we will say that the last coat of paint is a flat light green. Mix up a quantity of Prussian blue, to which you should add enough light chrome yellow to turn it on the green, then add a little black to take off the sharp edge of the green color, thin down with half oil and turps, to which add a sufficient quantity of liquid driers. To this mixture add a very little dry plaster; this will prevent the glazing color from sagging. Apply this to the burlaps, exactly as if you were using varnish, and rub out well. The effect is often improved by lightly wiping over the surface with a piece of soft cheesecloth. This method leaves the glazing color in the crevices and shows up the weave to good advantage.

R. N. Hunter.

—995—

Stained Buckram.

In the Central West they are bothered a great deal by buckram, wallpaper, etc., staining from alkali in the plaster, so here are the results of some experiments:—First, I found that all shades of green were affected, the light shades the most, either in calamine, ingrains, buckram or any wall finish of like character; second, I found that a size of gloss oil, hard oil or shellac, used thin for the papers, etc., and the regular alum size for kalsomine (on old walls) will stop it. I went to the best hard finisher here for the reason, and he says:—“A great many men, instead of measuring the amount of plaster of Paris and lime putty, guess at it, and as it is mixed in small batches, although it sets hard, still it leaves ‘soft spots,’ places where there is more putty than others, and again it is due to poor mixing. These ‘spots’ remain for years, so that any dampness, as from the size and paste or from rainy days, will make them active and thus destroy the color. You have no doubt found mildew behind wall finishes in houses that were apparently free from dampness.” This is the only explanation I ever had.

W. A. Walker.

—996—

Fastening Oil Paintings on Plastered Walls.

The proper method of fastening oil paintings, on canvas, to plastered walls was asked for and the proper way of preparing the walls for the purpose, both for old and new walls; also the method for fastening such paintings to old oil painted walls.

First, ascertain whether the back of the canvas of the oil paintings that you wish to mount on the walls has been well sized or coated. If such is not the case then apply a 5 per cent. solution of corrosive sublimate (chloride of mercury) in denatured alcohol to the back of the canvas, which will prevent mold. Plastered walls must be sized before the paintings can be mounted. If the wall be a new one it must be permitted to dry, and in order to prevent any alkaline action the wall must be treated with strong vinegar, and when dry it should be well sized, for which purpose a good wall varnish is recommended. Old plastered walls require no other treatment than to size them with wall varnish, of which one coat is sufficient unless the walls are very porous. Old oil-painted walls must be washed down thoroughly with soap and water, to which a trifle of ammonia has been added. A size will not be required if the wall be in good condition, but in all cases any cracks in the old walls must be filled in the usual manner before sizing, and any lumps or grains of sand knocked off before the paintings are mounted. The paste should be prepared as follows:—Dissolve one pound sheet glue in two gallons of water in the usual way, then add to this, while boiling, enough of the following paste powder to make a thick paste:—Five and one-quarter pounds wheat flour, one-half pound caustic soda and one-half pound sulphate of ammonia, well mixed. When this paste is smooth and free from lumps add, while still warm, one-eighth pint Venice turpentine or Canada balsam. Apply this paste lukewarm to the back of the painting and place the latter in position on the wall; then go over the surface with a heavy paperhanger's roller until the

proper adhesion is secured. This paste will be sure to make the painting adhere permanently on a dry wall, prepared as noted, and the back of the canvas having been impregnated as advised, it cannot affect the colors.

—997—

Cleaning Wall Paper and Mural Distemper.

To be successful in the art of cleaning wall paper and mural distemper decorations is in the practice more than anything else.

Take a shallow two-quart vessel; put in one pint of water with one-half ounce powdered borax. Bring the two to boiling very quickly, so that as little of the water evaporates as possible; then, while boiling, pour into the vessel one pound of best flour and stir all the while, keeping the vessel on the stove. Keep stirring until the flour and water are thoroughly mixed, then dump the mass onto a clean board and knead it for several minutes the same as a baker kneads dough when making bread, when it is ready for use. In cleaning walls or ceilings, take a piece about the size of your two fists and rub on the surface with sufficient pressure to make the cleaner crumble off slightly. Try it in some out of the way corner first; if it crumbles too much, there is too much borax in it or you did not get enough water in it. If it is sticky, you have too much water or not enough flour. I notice there is quite a difference in flour; with the best Colorado flour the above proportions used exactly as given do the best work.

When in use, work the cleaner in your hands the same as you would putty, so as to keep a fresh surface to clean with all the time, and with practice you will succeed.

The recipe given above is easily worth five dollars to any one having occasion to use it.

L. C. Reitze, Denver, Colo.

—998—

Powdered Mica for Decorative Purposes.

What is the name of the material that is used on some of the fancy souvenir postal cards that looks like diamond dust, and what kind of size will make it stick?

The material you refer to is mica, a more or less transparent mineral, which can be cleaved into very thin transparent sheets that are used in lanterns and stove doors. The sheets may be heated to redness in a muffle, and when cooled are ground into powder or granulated, as required. For the purpose you speak of, however, the sheets are simply crushed, boiled in hydrochloric acid, rinsed, dried and assorted to size. A solution of gum arabic in water will make the silvery powder adhere to paper, glass or wood.

—999—

Heraldic Colors.

Two "metals" and seven "colors" are employed, besides a number of so-called "furs." As heraldry was originally devised for the purpose of distinguishing the bearers of the shields from one another when in battle, the aim of the heralds was to make "tinctures," as these metals, colors and furs were called, as distinct and showy as possible. Where coats of arms were used in stained glass and for decorative purposes it was not always possible to get the pure tones, and the colors were often dulled; but care was always taken to get them as close as possible to the true heraldic coloring. Colors should always be laid on flat, with no attempt at shading, except where the description of the coat of arms specially calls for it. The primary rule in regard to heraldic coloring is that metal should not be placed on metal or color. There are, of course, exceptions to this, but in designing purely decorative heraldic devices the decorator will do well to follow this rule with reasonable fidelity, and as the "furs" are complicated they should not be used except in the representation of an actual coat of arms.

The heraldic metals and colors are known by their old French names. The following table will give first the heraldic name, second the English name, third the color:—

METALS.		
Or.	Gold.	Gold or yellow.
Argent.	Silver.	Silver (aluminum) or white.
COLORS.		
Gules.	Red.	Vermilion.
Azure.	Blue.	Bright sky blue.
Sable.	Black.	Dense black.
Vert.	Green.	Apple green.
Purpure.	Purple.	Rich blue red.
Sanguine.	Murrey.	Deep blood red.
Tenney.	Orange.	Orange.

Among the furs were ermine, white or silver with black spots; ermines, black with silver spots; erminets, white with black spots, with a red hair on each side; erminois, gold or yellow with black spots; pean, black with gold spots; vair, rows of blue and white shields, placed in rows, the bases of white resting on the blue; counter vair, the shields of one color placed base to base (if the tinctures are not mentioned, blue and white is the combination; if the colors vary the fact should be mentioned); potent, silver and blue crutch shaped objects in rows, the base of metal being placed on a base of color; counter potent, the bases of one color or metal being placed against bases of a similar tincture.

—1000—

Perfect Color Combinations.

The following harmonious color combinations were compiled by a prominent artist:—

- Black and white.
- Blue and gold.
- Blue and orange.
- Blue and salmon.
- Blue and maize.
- Blue and brown.
- Blue and black.
- Blue, scarlet and lilac.
- Blue, orange and black.
- Blue, brown, crimson and gold.
- Blue, orange, black and white.
- Red and gold.
- Red, gold and black.
- Scarlet and purple.
- Scarlet, black and white.
- Crimson and orange.
- Yellow and purple.
- Green and gold.
- Green, crimson, turquoise and gold.
- Green, orange and red.
- Purple and gold.
- Purple, scarlet and gold.
- Lilac and gold.
- Lilac, scarlet and white or black.
- Lilac, gold, scarlet and white.
- Lilac and black.
- Pink and black.
- Black, with white or yellow, and crimson.

—1001—

Paste for Pressed Paper.

Take two pounds of flour, mix with enough lukewarm water to the consistency of thick cream, add one ounce of powdered crystal alum, a pinch, say one-quarter ounce, of pulverized rosin and one-half ounce white sugar of lead, also powdered. Now add boiling hot water and stir until the paste is thoroughly cooked and shows adhesive properties. Use stout on rough walls and thin on smooth walls.

—1002—

Wall Paper Loosening on Hard-Finished Walls.

The application of glue size and sugar is required only for preparing painted or varnished walls and not for plastered walls. The walls of a kitchen are apt to be smoky, if not greasy, and should have been cleaned instead of applying the size. A good, thin flour paste, with about two ounces of alum dissolved in water to a bucket of the paste, put on as thin as possible, just enough to cement on the paper, is sufficient for a wall that has no suction; but where the wall is soft or porous, the paste must be put on thick. The vapors generated in a kitchen will soften the size and loosen the paper.

—1003—

Papering a Parlor with Beamed and Panel Ceiling.

In a parlor, the side walls of which are to be papered in white and gold relief and the brick breast brought up in white enamel, the ceiling is beamed the length of the room and paneled between, the side beams being lower than those in the middle of the ceiling.

From this description it would appear that the architect has intended to carry the cove moulding at the bottom of side beams round the entire room, casing up the end walls flush with the plaster, so as to avoid the unfinished appearance of butting the beams into the plastered walls, but the carpenter has probably misunderstood the drawings. There are several methods to partially overcome the difficulty:—

1. Use no frieze, but carry the wall paper up as far as the plastered wall continues, cutting in between the beams.

2. Carry the frieze round the room about 18 to 24 inches below the lowest beams. Above this use a ceiling paper that matches the side walls, cutting it in between the end of the beams, and either tint the ceiling panels with distemper or use a plain tint paper.

3. Use the ceiling paper for the frieze, keeping the picture moulding at the level of the top panels of the doors. The frieze can then cut in between the beams.

—1004—

Painting of Lincrusta with Oil Colors.

A heavy bodied boiled oil, such as is used in the manufacture of linoleum, i. e., pure linseed oil that is boiled with the required drying mediums, until it attains the consistency of heavy syrup, mixed with the desired colors, is the best material we know of for the purpose.

—1005—

To Finish a Parlor in White, Trimmed in Gold.

We should say that with gold trimmings the white finish should be neither a dead flat, nor should it have too high a gloss. It should have a soft velvety finish that is produced by rubbing down the final coat of varnish with water and

rotten stone. The usual method is to give three coats of white lead, flat; each coat is smooth sandpapered when dry. Next one coat of equal parts white lead and zinc white, which when thoroughly hard and dry is rubbed down very smooth. Then a coat of French zinc white in damar varnish, thinned with turpentine only, is applied, and this dry, the same mixture, to which is added some good pale varnish, is used as the final coat of paint. Then a coat of best damar or other white varnish, to which a trifle of zinc white in damar is added to kill the yellow cast of the varnish. When the work is to be gilded or bronzed, however, the zinc white must be omitted from the varnish. After rubbing down the finishing coat of varnish with water and rotten stone, the surface should be rubbed with sweet oil until dry, having the soft and uniform appearance of velvet.

—1006—

Removing Old Wall Paper Without Destroying or Blurring the Pattern.

It was desired to remove from a room some wall paper over a century old, that was in good condition, as it was desired to save some of the paper without blurring the figures. Could this be done by closing the room and generating steam by having a kettle of water boiling in the room?

The method you yourself suggest appears to us the only feasible one, but we cannot say whether you have any show of success, as it depends very much upon the medium with which this ancient paper was attached to the wall. Was it flour paste or was it glue, and how strong is the fiber of the paper? We would suggest that you first make a test on a small space on a panel, that you do not care so much about, bringing your steaming kettle fairly close, and if you succeed in loosening the paper here, you can assume that you can do it with the rest. We would also suggest that you also try to save the paper by direct soaking with water.

—1007—

Hanging Heavy Embossed or Pressed Wall Paper.

We will begin by giving you a few practical hints. In hanging paper, where the room has been occupied for a time, it is essential that the room be cleaned, the floor washed, the ceiling and walls well brushed down, and, if there are any flyspecks visible, washed down. When beginning work the paperhanger should have handy a piece of pumice stone, a basin of clean water, a clean sponge and towel, and use the same when and wherever needed. It is best to use a round brush for the paste, because easier handled than a flat one, and cleaner, also, as it can be turned in the hand, thus preventing the paste from soiling the printed side of the paper.

It is not so very difficult to hang pressed or heavy embossed wall papers, but greater care in handling is required and more time must be necessarily taken than is the case with ordinary goods. In the first place, it is necessary that the walls should be lined with brown paper, so as to give a more absorbent surface to the paste on the embossed paper, so that the raised or pressed figures will not be unduly moistened. Embossed paper will not stick well to a hard finished or plastered wall without this lining paper. The ordinary wheat flour paste will serve well enough for fastening the lining paper to the wall, but it must be quite heavy for embossed or pressed paper. Each piece of the embossed paper must be trimmed dry with straight edge and knife before pasting, and while this requires greater care in applying the paste, it is necessary, in order to get the piece quickly on the wall before the paste has an opportunity to soak into the relief figures and make them limp and flat. A very soft brush must be used in applying the paper in place of the stiff brush or roller, and the seams should be allowed to dry before applying the steam roller, and even then the roller must be handled gently, because the color leaves embossed

paper more readily than is the case in ordinary papers. The principal point is to handle the paper delicately, without resorting to the usual pressing in or stretching so common in hanging ordinary goods.

—1008—

How Pressed Wall Paper May Be Hung with Satisfactory Results.

Pressed or embossed papers will not stick well on a hard wall, and here is where your trouble comes in. A double operation is required for this class of work. The walls must first be lined with brown paper, so as to give a more absorbent surface for the paste on the pressed paper to obtain a hold, so that the pressed figures will not be unduly moistened or soaked.

Without this lining pressed or embossed paper will not adhere without pressing down, which is the cause of obliterating the figures. The ordinary wheat flour paste will serve well enough for pasting the brown lining paper to the wall, but for the pressed paper the paste must be made quite heavy. Each piece of embossed or pressed paper must be trimmed with straight edge and knife before applying the paste, and while this requires greater care in putting on the paste, it is absolutely necessary, in order to get the paper on the wall quickly, before the paste has an opportunity to soak into the relief figures and make them limp and flat. A very soft brush must be used in applying such paper in place of the stiff brush or roller, and the seams must be permitted to dry before using the seam roller, and even then this roller must be used gently, because the color is apt to leave pressed or embossed paper more readily than is the case with ordinary papers. Do not attempt to press or stretch the paper.

—1009—

Repainting Burlap on Walls.

Burlap is usually bought dyed in the desired color and it cannot be re-dyed on the wall. But it can be renovated with the proper color in oil, thinned with either turpentine or benzine, so as to dry flat or with a faint eggshell gloss. The color used should be strong in order to stain the burlap uniformly. Colors of that character can be thinned to a great extent, and on that account will not be very expensive. Manufacturers of burlap make special stains or dyes which can be used for coloring or stenciling on burlaps after they have been hung on the wall.

—1010—

To Mix Delft Blue for Decoration.

Delft blue is a soft blue tint that can be produced by mixing zinc white with imitation of cobalt blue. If the latter is not handy, it may be made with ultramarine blue and a little Chinese blue (not Prussian blue). If wanted for enameling, we would suggest one pound of imitation of cobalt blue, ground in varnish for twenty pounds zinc white, ground in damar varnish, thinned with white enamel varnish or damar varnish to flowing consistency. Or three-quarters of a pound ultramarine blue in varnish and one ounce of Chinese blue in varnish to twenty pounds zinc white in damar varnish. If this is not soft enough in tone, a trifle of light chrome yellow in japan will bring about the proper result. Whether the figures here given will give the result desired will depend upon the tinting strength of the colors used. The color is in imitation of pottery made at Delft, in Holland, and is found in various depths of shade.

—1011—

Wall Colors to Harmonize With Mission Finish.

What colors will look best in combination with mission finish? Lodge hall and clubroom to decorate, the woodwork and furniture of which is in mission

finish, the walls to be done in two colors to harmonize. The ceilings will be paneled with wooden beams, while the head casings that will continue all around the rooms will divide the lower and upper colors on the walls. A wainscoting of wood will be up to the window sills, forming a panel between each opening.

To relieve the somber aspect given the room or rooms by the mission finished woodwork and furniture, we would advise for the clubroom a deep bronze or bottle green for the lower wall color and a rich Turkey red for the upper one. For the lodge hall we should select a dark buff tint made from raw Italian sienna and white for the lower wall color, while for the upper portion we would suggest an old ivory tint made from white, tinted with a trifle of lemon chrome yellow and raw sienna. If the color effect for the lodge hall is to be more somber, a warm burnt umber tint of the appropriate depth for the lower portion of the wall and a similar tint of a much lighter shade for the upper portion. Remember, however, that light green, gray, blue, strong yellow or clear white will not answer for decoration with mission finish. Much depends upon the lighting of the rooms and on the taste of the architects or owners.

—1012—

Drawing Lines on Wall Paper with Distemper Colors.

If your distemper color has been ground in water without size, use gum arabic in solution, and add a trifle of beef gall and a few drops of glycerine, if the gall will not do the trick alone.

—1013—

Treatment of Dyed Burlaps for Stenciling.

The treatment necessary to give dyed burlaps in order to paint or stencil on it and prevent the paint from spreading.

Dyed burlaps need no treatment if the right materials are used in the stencil work. Colors ground in japan and thinned with turpentine will make a good paint for stencil work and will not spread.

R. N. H.

—1014—

Tiffany Finish.

Meaning of the term, "Finish the walls Tiffany."

The term "Tiffany" as applied to the finish of wall paintings is a name given to a process of "glazing." The walls are first painted several coats according to the requirements of the case, and the last coat is many shades lighter than the finished effect is intended to be, and is "flat."

A rich blended and mottled effect is then produced by applying a thin coat of staining color made as follows:—Say for instance that it is intended to produce a rich mahogany coloring, shaded and blended to produce an effect of rich leather goods. Burnt sienna is mixed with two-thirds oil and one-third turps. Sufficient dryer is added according to the quantity of the material and the strength of the dryer and then a little whiting or wax is included to prevent sagging. After the walls are coated with this mixture, which is exactly similar to a stain, it is stippled to remove the brush marks and it can afterwards be given a mottled effect by being daubed with a clean ball made of cotton waste or cotton batting covered with cheese cloth, or the wall can be made to look more like the leather effect by having spots of green or red daubed here and there before it is stippled. After these spots of foreign color are added, it would be well to blend them into the main color by using a badger blender and afterwards the stippler.

R. N. Hunter.

—1015—

Fastening Canvas to a Circular Ceiling.

A practical method to fasten canvas to the circular ceiling of a church, without showing seams and tack heads. The ceiling is to be finished in water color, and as a general thing the tack heads will rust and show through.

Use heavy unbleached muslin, rip off the selvage, so that it will not cause ridges to show when on the ceiling. Cut the strips to suit the circle, but have each strip the full length, so that none will have to be pieced. Soak all the pieces, at the same time, in a tub of paste, which has a board with a hole in it nailed over the top, through which the muslin is drawn, removing all loose paste. Then place each strip in its proper position on the ceiling, taking care to butt them properly and not overlap them. Use no rollers or brushes, but smooth out with the hands, then scrape and rescape with broad knives and painters' scrapers until all the superfluous paste has been removed. When dry, any imperfections that may have been in the plaster will not be visible any longer, and the canvas so treated will be firm as a rock. The paste must be a flour paste, but stouter than ordinary paperhangers' paste, and should be warm when the muslin is placed in to soak. The addition of a gill of Canada balsam to four gallons of paste will improve it.

—1016—

Paste for Hanging Sanitas.

Do you use the same flour paste to hang Sanitas as you would use on ordinary paper?

In hanging Sanitas we use nothing else but the old-fashioned home made flour paste, the same as for ordinary wall paper, but there is quite a difference in the method of using it. Whereas, we paste the wall paper before hanging, the walls are pasted before applying the Sanitas. The paste is made heavy and put on the wall quite heavily with a brush. The Sanitas is then applied without trimming. After it is laid on the wall or ceiling and smoothed out with the ordinary paperhanger's smoothing brush, the canvas is then gone over with a trowel or broad scraper for the purpose of squeezing out all of the unnecessary paste. This squeezing has a double effect. It squeezes out the paste and forces the canvas to a perfect contact with the surface. When pasting the wall, only sufficient surface should be pasted to take the breadth of canvas. In hanging plain Sanitas as a ground for kalsomining, when a joint is made it should not be made tight or close. There should be a space of about a sixteenth of an inch between breadths. These spaces are filled up with a mixture of kalsomine, which is to be used thickened with plaster, and is applied to the seam just before kalsomining. Be sure the cement is composed of the same tint of kalsomine as is to be used for the finish of the ceiling. Before this is done, however, the entire ceiling should be washed off with a sponge and clean water, for the purpose of removing any paste which might have been squeezed onto one breadth from another, or from the hands. It will be found that this method will produce a very perfect job. Sanitas being waterproof can be kalsomined before the paste is thoroughly dry.

R. N. Hunter.

—1017—

Restoring Color of Light Moss Green Burlap.

For recoloring faded burlap the best material is flat oil paint, and we would suggest that you make a light moss green by mixing zinc white in oil, raw umber in oil and a light shade of chrome green in oil, using none but chemically pure materials. Mix these in the proportions that will give the shade required and add some drying japan, then thin with turpentine, or if this is too expensive, with turpentine substitute, benzine being too apt to produce gloss on the burlap. We should start with one part by weight of chrome green, two parts of zinc white and two parts of raw Turkey umber and test for shade by placing a few drops of

the mixture on white blotting paper; if not green enough add more chrome green, if too dark add more zinc and a little chrome yellow, if too light add more raw umber and green. We cannot furnish exact proportions, as colors in oil, no matter if chemically pure, vary in tinting power nor do we know how light a moss green you require. Make your paint rather thin, but not as thin as you would a stain for wood, and apply it quickly with a wide flat brush, taking care not to cross and recross too often, as then you will have shiners. If you desire to have it dead flat, or nearly so, as it should be apply it more as you would a stipple.

You can also recolor burlap by using distemper color, but it is not as sanitary as the flat oil paint, because the size in your distemper, unless mixed with antiseptics, is liable to mold, and unless well sized, the distemper (water color) is not proof against moisture.

Some of the burlap manufacturers make special dyes for coloring fabrics of this kind upon the wall.

—1018—

Flat Wall Paint for Covering Wall Paper.

Flat wall finish for application over wall paper or felt, and the best way to size felt.

The best size for felt paper that is to apply to felt paper before the flat wall finish is to be applied is glue size prepared in the usual way with about two ounces of alum to one gallon of size. Two coats of this will be required to stop suction, and the first coat of size must be hard before applying the next. The same size, but more liquid, will answer for ordinary paper as a ground for the flat finish referred to. To incorporate hard oil finish into pulped whiting, beat up the latter first and add the varnish little by little, always stirring one way only. If the mass becomes too tough or gummy to work with the stick or paddle, add benzine, a little at a time, while stirring until the paint is workable. The varnish is to serve simply as binder. Try it in a small way first by weighing out, say two pounds of the pulped whiting and adding thereto about six ounces of the hard oil. The pulped whiting must be free from lumps, which may be eliminated by passing the mass through a sieve.

—1019—

Decorating a Wood-Lined Church Ceiling.

A church ceiling was to be decorated which had been ceiled with wainscoting lumber about two inches wide. The boards were badly drawn apart, leaving cracks from one-quarter to one-half inch wide.

If the ceiling is a large one, without subdivisions or small panelings, it may be covered with unbleached muslin. To make the best possible job the muslin will have to be stretched on, by tacking around the edges and through the center, in a systematic way. It would not be satisfactory to paste it on, or glue it to the wood ceiling, for the reason that the unevenness of the wood would show through the canvas, and the cracks would cause blisters and wrinkles to appear all over the ceiling, thus marring any decoration that you may execute. Therefore, with the information given us, we would advise to fasten the unbleached muslin to the wood ceiling with tacks in the following manner:—First, ascertain the size of the ceiling, and, if possible, either procure sheet muslin or canvas of a size sufficient to cover the entire ceiling, or have the widest material that you can procure sewed together, so as to produce a sheet big enough to do the same thing. If the ceiling is so very large that it seems impossible to do this it will be necessary to divide the ceiling into four quarters, by striking a line through the center, through the width and the length, and then stretch the muslin within the spaces thus marked out, and cover the joints with a small, half-round moulding. This half-round moulding will hide the joint and help to support the canvas around the edges, and will not show to bad effect when the ceiling is all tinted, moulding included. The method of tacking and stretching

the muslin is as follows:—First, be sure to procure unbleached muslin of a good and heavy quality. Then tack the muslin on one end, then pull it out taut and tack to the other end, after which tack it on the sides, pulling out all the looseness and wrinkles that it is possible to do without extra straining. When this is accomplished wet the canvas all over with a sponge and clean water, and then finally, before this is thoroughly dry, tack here and there through the center and body of the panel wherever necessary to prevent bagging or sagging of the canvas. When all is dry it will be found to have stretched out tight and smooth, and will be ready for the decoration. The kalsomine can then be applied thin enough (but well glued) to spread evenly. No alarm need be felt if, after the kalsomine is applied, it is found that the canvas looks very baggy and full of wrinkles. This will all disappear when the whole thing is dry, and another very important point to remember is not to have any unusual heat in the room, in order to facilitate the drying. Don't try to hurry the drying. Open the windows, if the weather is not freezing or damp, and let it dry out naturally, even if it seems very slow. If it is desired to finish with paint instead of kalsomine or water color it will be necessary to first apply a coat of size to the canvas, the same way as the kalsomine is applied, with a short and stiff kalsomine brush, and in making up the size add a little whiting to it, to enable you to see that you are covering the canvas thoroughly. When this coating is dry one can apply any number of coats of oil paint the same as to wood or plaster. If the ceiling is already laid out in panels, small enough to be covered with stock widths, or if disposed to lay it out in small panels to fit the stock widths, we would suggest communication with some of the manufacturers of burlaps and decorators' fabrics in regard to a material known to the trade as prepared canvas. This material is the very best possible to procure for the purpose. It is to be tacked up in the same manner as the muslin, but is not to be stretched by water. Instead of that method it should receive a coat of glue size which, after drying, will stretch like a drum head and will then be ready for any kind of decoration (paint or water color) and will last indefinitely. If the panels are not very large it will not be necessary to tack through the center, and in fact it will be better not to, when using the prepared canvas. One word of caution as to the necessity of examining the surface upon which the canvas is to be placed before you apply:—If it is found that the surface of the boards are lumpy, warped or uneven for any reason, or that it is likely that some of the boards will stick out and show their outline through the canvas, we would advise that flat strips be first tacked all around the edge of the panel in the shape of a frame upon which the canvas could be stretched. The strips need only be quite thin, just strong enough to drive the tacks into.

R. N. Hunter.

—1020—

Removing Varnished Tile Paper from Walls.

First remove the varnish from the paper with aqua ammonia, then soak the paper with hot water and remove paper in the usual way. If Venice turpentine or Canada balsam has been used in the paste, it will be difficult to remove the paper with hot water, but a small portion of ammonia added to the hot water will facilitate the work.

Paperhangers who have much work in the line of removing wall paper, use a spraying steam apparatus, that is made for the purpose, in place of hot water. Lime spots should be treated with vinegar first, and when this has dried, should be touched up with a thin size of wall varnish and benzine.

—1021—

Painting a Red Burlap Covered Wall a Delft Blue.

Use the ultramarine blue in oil, sold as imitation of cobalt blue, two parts by weight to one part by weight of pure French process zinc white in oil, mix very thoroughly and thin with bleached or refined linseed oil, adding a moderate

portion of japan drier. The color, Delft blue, derives its name from a town in Holland where fine porcelain was decorated with this blue.

For painting the burlap make the color as above, using ordinary zinc white and cobalt blue in about the proportions given, but thin the mixture with little oil, only just enough to bind it well, and thin down with turpentine or benzine to a consistency that will not clog the weave of the burlap. It will be difficult to cover the red in one coat and you may have to apply two coats and stipple it to keep from running.

—1022—

Papering on Wood Fiber.

The walls were finished with a flat paint and, after being thoroughly washed, were sized with a thin coat of glue, and when the job was finished the paper dried full of wrinkles. We are asked to tell where the blunder is and what is the easiest and best way to remove the paper in order to do the job over again.

In the first place the walls should have been sized with a mixture of glue and molasses with a little glycerine added; and, secondly, before hanging the varnished paper he should have covered the walls with a lining paper. And the paste should be made from the best wheat flour. The varnished paper then can be hung without any fear of wrinkles. Referring to the question of sizing, if the paperhanger wishes to make his own sizing he can add about a pound of glue to a pint of old-fashioned molasses and a very little glycerine, and enough water should be added to make the size dry so it will stick. We have never seen any advantage in adding molasses, syrup or glycerine to paste. Good old-fashioned paste, made of the best wheat flour with a little alum added, will stick to anything, especially if properly sized.

In order to remove the paper now on, it will be necessary to cut the varnish first, and for this purpose use a solution of soda and water, paint and varnish remover, or rub it over with sandpaper, and the paper then soaked with hot water and then scraped off.

As our correspondent does not give us any particulars as to the construction of the wood fibre walls, we are unable to definitely decide the exact reason for the wrinkles. We have assumed in our answer that the walls were smooth and even, without any open joints. But if the wood fibre wall is composed of sections with open joints, that would explain the trouble of the wrinkles. No paper of any kind can be hung on wood over joints without the trouble of bad wrinkles, and the only way to overcome such trouble is to fill up the joints with a mixture of muresco plaster paste and varnish. When this mixture is applied to fill up the cracks or open joints sandpaper smooth. The entire walls will then have to be lined with a thin lining canvas before being papered with a varnished paper.

R. N. Hunter.

—1023—

Blistering of Wall Papers and Reason for Same.

Wanted to know why some wall papers blister after being applied to a wall, while others dry out smooth and remain so, and in some cases the bubbles or blisters remain permanently.

We believe trouble to be due to the consistency of the paste used. A watery paste will not answer for certain kinds of paper; in fact, it will not answer at all. Nor will too stout a paste answer for lightweight paper. The paper must not be soaked before being applied to the wall, and great care must be taken to make the paste adhesive. Paste that bubbles when put on the paper should not be used at all, because it contains too much free water. Of course the quality of the paper is also liable to cause blisters, but when the paste is right and the paper smoothed down, there need be no blisters on drying out. When alum is used in the paste the quantity should be very moderate.

—1024—

Blending Interior Walls in Tiffany Effect.

Tiffany decorative effects on walls are produced by blending colors into one another until an effect is obtained, such as would be given on the opposite white wall of a building, a church or hall, for instance, that has colored glass windows through which the sun's rays penetrate, throwing the various colors of the glass on the wall. The more colors are being blended into one another the richer the effect. This can be done best by distemper colors tempered so that they do not set up too rapidly, otherwise the work will appear streaked. Of course, it requires practice and good judgment in selecting the colors, which must be of the non-blending kind; that is, they must not run.

—1025—

Decorating Walls and Ceiling of a Church Sanctuary.

The walls and ceiling of the sanctuary of a church are to be finished in gold. The wall above a mahogany panel work is to be run into the oval ceiling without corners. Surface to be finished approximately five hundred square feet. It is painted plaster at present. Will pure gold leaf be necessary for this work or can a permanent job be made with bronze by burnishing same?

You cannot make a permanent job with gold bronze, no matter how high a grade of bronze you may select. It is not in the nature of the material to remain without tarnish for any length of time. Even in the selection of the leaf it is necessary to be careful and purchase only from those who guarantee it strictly pure. Before laying your leaf, ascertain whether the plaster surface has been painted with distemper or with oil paint, because, in the former case, your gilding size should be made from parchment or isinglass in water, the same as for gilding on glass, only stronger, and a little yellow ochre, ground fine in water added. If painted with oil paint, it is best to sandpaper the surface, dust well and apply a coat of thin varnish size all over, let it dry hard and lay your leaf in oil gold size, to which a trifle of medium chrome yellow in oil is added. Do not drown your leaf with too much size and, when you have made your first application of leaf, go over it with tufts of cotton, then use the same size and give another layer of leaf, so that no spots are missed or imperfections shown. When dry, burnish with silk or other soft cloth.

—1026—

How to Hang Lincrusta.

For hanging lincrusta, use ordinary paste to which a little glue has been added warm and worked into the paste evenly. Fish glue is best. In hanging, paste a strip and attach it at the top, under the cornice and gradually press it to the wall, making the joint good until it reaches the bottom. In doing this, care should be taken to work from the center outwards, so as to prevent air from getting under it and preventing perfect adhesion. The appearance of blisters on the surface after the material has been fixed is caused by the paste swelling the paper. This will dry right back again into its place. The blisters can easily be removed by pricking the surface with a penknife so as to allow the air to escape.

—1027—

Ceiling Trouble.

A correspondent gave the following statement of facts:—I have been called upon by one of my customers whose work I have been doing for the last four years, and only last week my attention was drawn to a main hall and dining room ceilings, which look very badly. To describe the condition, they look as if they

were varnished over kalsomine. I tried to wash off some of it, but could not. Now, to make this question easier for you to solve, I will give you some information which I have found upon my investigation:—

When the ceilings were done the vestibule ceiling was also done with the same color, and that ceiling is still in perfect condition.

The family had considerable sickness since the above mentioned work was done, and disinfecting and fumigating played an active part quite often. I thought sulphur could do the damage, and to prove that, the vestibule ceiling is perfect. The upper hall ceiling, getting the most, shows the result baked in.

Although it is not clearly stated in your letter whether you want us to tell you what, in our opinion, is the cause of the trouble or as to the method of curing the defect, we will assume that information on both sides will be acceptable.

In the first place, your description of the condition "baked in" does not convey very clearly to us just what the appearance of the ceiling is. If the ceiling surface has turned dead flat, with here and there a patch of gloss, it would indicate that the plaster had not had enough paint on it and had been sized with glue size between coats. Or if the next to the last coat had been a gloss coat, composed mostly of oil, and the finish flat coat had been all turpentine and applied too soon on top of the oil coat it would produce the condition described.

There is also some foundation for the opinion expressed by you, viz.:—That the old kalsomine was not washed off and a coat of varnish applied over it and then painted. Another possible cause for such trouble is due to the habit that some painters have of using ceiling varnish as a priming coat and attempting to finish with a coat of paint on top of this foundation. All of these methods are at best only temporary makeshifts, and while they may look all right when the job is completed, they will eventually turn out badly. All this goes to prove that there is only one way to produce lasting and satisfactory results, and that is, "use no substitutes either in materials or methods."

The use of sulphur in a disinfectant will have the effect of causing a black spot or streak to appear here and there on the surface of paint composed of lead and turpentine, or lead, zinc and turpentine, although this is rare. We have also seen cases, though they are rare, where the reason for glossy patches could be attributed to the use of disinfectants.

The point stated by you that the vestibule being in perfect condition would prove that disinfectants had caused the trouble, on the interior, is not conclusive. Vestibules, as a general rule, are always painted, whereas ceilings on the interior are, as a rule, kalsomined.

Under these conditions, perhaps, the interior ceilings showed defects, because of poor foundation coats, where the vestibule, having been painted many times before, had held up better.

Robert N. Hunter.

—1028—

Mixing Glazing Liquid for Oil Tiffany Work.

Information wanted as to a formula for mixing the best and most durable glazing liquid for oil Tiffany color work. Should hold up the color, so as not to run together and dry with a sheen gloss.

The liquid you are looking for is best made by the use of "bodied" or "blown" linseed oil, a brand sold as crystal oil offered to the painting trade in one or five gallon cans being the proper one to use, as it is quite pale and will not affect the delicate colors. It should be thinned with pure spirits of turpentine and a moderate quantity of gold size drying japan. We would suggest five pints of the oil, two and one-half pints of turpentine and one-half pint pale gold size japan as the right proportion for the mixture to try out, modifying the proportions according to the work in hand or to suit the nature of the pigment and vehicle of the colors used.

—1029—

Tiffany Blends in Oil or Distemper.

Tiffany blends are most easily handled as oil color glaze, while in distemper quite an extended practice is required and an intimate knowledge of the mediums for best blending of the colors into one another without making laps and ridges. Oil glaze blends will flow out more freely. We are unable to give any rule as to the proper colors to use, and all we can say is that the origin of the Tiffany blends came from the effect given on the white or delicately tinted wall of a church, where the rays of the sun through a colored glass window produced the vari-colored blends. The colors mostly used are permanent red, blue, yellow, green, with enough white to blend into one another. The best liquid for the oil glaze consists of six parts bleached linseed oil, one part coach japan and three parts turpentine, by measure.

PASTES, GLUES AND CEMENTS.

—1030—

First Class Flour Paste for Paper Hangers.

The best paperhangers' paste, or, in fact, any paste for paper, is wheat or rye flour beaten up in cold water to perfect smoothness and the consistency of very thick cream, then put on a fire and brought to a boil, while constantly stirring to prevent scorching. When the mass has become thick and glossy it should be taken from the fire. To keep from mold or souring add one teaspoonful of carbolic acid to a bucket of paste. When wanted for use, thin to the required consistency with cold water.

Permanent paste in powdered form may be made by mixing dry 84 parts by weight of flour or starch, 8 parts pulverized caustic soda and 8 parts ammonium sulphate. The latter is added to neutralize or counteract the strong effects of the caustic soda on colored or tinted papers. When wanted for use, mix the powder with enough water to give the required consistency.

—1031—

Flour Paste That Will Not Become Liquid Again.

Take two pounds wheat flour and one pound starch, mix each separately in cold water to a stiff batter, carefully beating out all lumps, then thin with more cold water to a pudding-like batter and mix the two batters in one pail. In two gallons of hot water dissolve one and one-half ounces of alum and have the solution boiling hot, and while stirring the mass vigorously, pour this hot water upon it slowly, until the paste swells and darkens. If the paste should by any chance become thin, heat it over a slow fire, while stirring.

—1032—

Paste for Wall Paper That Will Not Sour.

Practical paperhangers, in business for many years, are unanimous in the opinion that a paste made from wheat or rye flour cannot be improved upon. It is made as follows:—For use on very delicate paper take fine sifted wheat flour; for ordinary paper, dark rye flour. To make an ordinary pail of paste, take two pounds of either kind of flour and mix it with cold water, beating it to a stiff paste until all lumps are broken up. Then take a heaping teaspoonful of finely pulverized alum and stir it well into the paste. Then stir into the mass, gradually, six quarts of boiling water, beating the mass until smooth. Should the paste, on standing over night, show separation of the water, it may be boiled at a low heat while being constantly stirred for fifteen or twenty minutes. To keep from souring put in the quantity mentioned thirty drops of carbolic acid.

—1033—

Dry Paste in Powdered Form.

A formula was asked for paste powders, one that can be kept indefinitely without losing its adhesive qualities, when finally mixed with water and that will not act on colored or tinted papers disastrously.

A dry paste of this description was patented and placed on the market some years ago, and consisted of an intimate mixture of wheat flour, ninety-two parts by weight, and eight parts pulverized caustic soda, but it was very apt to affect the colors of the wallpaper. Whether it is still on the market we do not know. A better dry paste powder, in which the caustic soda is neutralized and the resulting paste from which will not affect the most delicate colors, can be made

by mixing eighty-four parts by weight of flour or potato starch, eight parts by weight of caustic soda or potash in powder, eight parts by weight of ammonia sulphate (Glauber's secret sal ammoniac or secret salt). To make it into paste, use lukewarm water, add slowly while stirring and beat it until smooth and of proper consistency. Keep the powder in a closed receptacle in a dry place.

—1034—

How to Mix Venice Turpentine with Paste for Hanging Burlap.

It is not necessary to reduce the Venice turpentine with any other liquid in order to get it mixed into the paste, nor is an excess of it beneficial. The following is an excellent recipe for a paste used in hanging burlap, crepe or buckram. The paste should consist of one pound of good glue, soaked in two gallons of water and then dissolved in the water bath. Into this is stirred enough paste powder to make a stiff paste, and into this still warm paste two tablespoonfuls of Venice turpentine or Canada balsam are stirred. The former is preferable and may be warmed before adding it to the paste. The paste powder consists of eighty-four parts by weight of wheat flour or potato starch, eight parts by weight of pulverized caustic soda, and eight parts by weight of sulphate of ammonia, and the mixture should be put through a wire sieve to keep out the lumps.

We do not know of anything better to mix with the paste than Venice turpentine, but are of the opinion that, although this material is apparently high in price, so little of it is required in a bucket of paste that it does not increase the cost very materially.

—1035—

Paste for Hanging Paper on Varnished Surface.

A formula was wanted for making a paste to be used on a smooth finished wall that had been varnished.

Make flour paste as usual, but omit the addition of alum. In place of this, add to an ordinary pail of the paste three sheets of isinglass dissolved in one pint of hot water and two unces of refined glycerine. If it is difficult for you to procure the isinglass, use in its place one pint of the very best golden syrup. Paste so treated will make the paper adhere permanently to a glossy wall, unless removed through continual dampness or rising steam vapors. If the walls have been varnished for a long time, they are apt to be dirty or greasy, and as an act of precaution they should first be cleansed with suds made from white castile soap and warm water, then rinsed with clear water and dried with chamois skin.

Another method is to first size the wall with glue size to which old-fashioned New Orleans molasses is added in such proportions that it will feel sticky when pressed by the palm of the hand. Then use the best flour paste for hanging, as thick as it can be used.

—1036—

Hard "Marine" (or Waterproof) Glue.

This is made in several ways, of which the following is suited for preparing a waterproofing compound for damp walls. Put into a steam or water lined vessel (such as a glue pot) one pint of oil of turpentine, one-half pint of bisulphide of carbon, ten ounces of caoutchouc, ten ounces of whiting, five ounces of rosin and five ounces of asphaltum. Warm this mixture over a closed-in fire, being careful not to allow any vapor given off to reach the naked flame. When the mixture is homogeneous, it is ready for use. The wall is scraped smooth and clean, and the glue compound applied with a hard brush to the wall on the damp place and carried up about eight inches higher than the line of dampness. Before the glue is dry, lay on strips of paper, which will adhere tightly. On the plain paper the wallpaper can be pasted in the usual way. If properly done the wallpaper will always remain dry.

—1037—

To Prepare Waterproof Glue.

Dissolve three-quarters ounce of sandarac resin and three-quarters ounce of mastic resin in ten fluid ounces of denatured alcohol (not denatured with benzine or hydrocarbon fluids), and add three-quarters ounce of turpentine. Put the solution in a glue-boiler over a fire, and gradually stir into an equal quantity of a strong, hot solution of glue and isinglass. The mixture is ready for use after straining it, while hot, through a cloth. Articles glued with this preparation can be steeped in water without separating.

H. C. Standage.

—1038—

Waterproof Glue.

The simplest way to make this is to boil one pound good animal glue in three quarts of skimmed milk. To keep it from souring, add thirty drops carbolic acid, when the solution has cooled.

Another waterproof glue is made by dissolving glue, as usual, in water and when about to use, two per cent. by weight of bichromate of potash in solution is added. That is, for every three pounds of glue used in the solution, one ounce of bichromate of potash is dissolved in water and so added.

The liquid waterproof glues described above can be used as binders for water colors, the one made by boiling glue in skimmed milk acting somewhat on the order of a caseine medium, which is fairly durable in outdoor work, having stood well for nearly two years. The glue size to which the bichromate of potash solution is added just prior to its being used simply derives its weatherproof virtues from the fact that the glue is rendered insoluble by the action of the potash salt.

As glue sizes have the tendency to foul when applied to moist ground, it is best to prepare such a surface by giving it a coat of a size made from softsoap, say one pound dissolved in one-half gallon of hot water, to which is added two ounces glue dissolved in one quart of water and four ounces alum also dissolved in one quart of hot water. When this has dried hard the distemper color or the dry color mixed in water to which has been added the glue size referred to and the solution of bichromate of potash may be applied without fear of early perishing. To make the distemper color work more freely and wear still better the color may be mixed with 25 per cent. linseed oil, raw or boiled, and 75 per cent. soft water instead of using all water before the glue size is added. If the glue is of good quality the size should be made from three quarts of water to the pound of glue. The quantity of size required for outdoor distemper paint of course depends largely upon the pigments employed and rules cannot be laid down. The operator must find this by practical trial.

—1039—

Formula for Making Rubber Cement.

Rubber cement can be prepared with different solvents, but in no case should they be made at night, when light is required or near an open fire. If heat is necessary use a hot water bath or sandbath; if solutions are made in the cold way, have the vessels closed tightly and keep them out of doors. This precaution is important, because of the extreme volatility and inflammability of the solvents used. To make rubber cements, use pure Para rubber and cut it into thin shreds with a very sharp knife, that is constantly dipped into water. A dull knife wetted with water will cut rubber more freely than one that is very sharp but not moistened. By using carbon bisulphide a solution may be had in two days without using heat. Place in a glass jar with wide mouth enough shredded rubber to occupy one-sixth of the depth of the jar and pour over this enough carbon bisulphide to fill the jar five-sixths of its capacity. Close jar tightly with a glass stopper, if possible, shake it vigorously and set aside. Shake the jar

again at intervals until all the rubber has dissolved. If too thick to flow, add more bisulphide of carbon. Rubber cement for sticking leather to rubber or rubber to leather is made by substituting benzine for the bisulphide of carbon, but the benzine must be free from oil. To obtain a solution more rapidly, make it in the water bath, but do not have the temperature too high.

—1040—

Dissolving Old Rubber.

How can old rubber goods, such as rubber boots, shoes, etc., be dissolved and the rubber recovered?

This is a difficult task and the game not worth the candle, unless it can be done in a large way. Bisulphide of carbon is the only active solvent known for this material, and as the solvent is of very offensive odor and extremely poisonous and its vapors rather inflammable, the work must be done out doors and for the sake of safety in the following manner: In an airtight drum of boiler iron, provided with a strong screw cap and a steam coil, place the rubber, that has been cut into fine shreds with five parts its weight of carbon bisulphide, close the screw cap tightly, turn on steam, heat for one hour, when the rubber part of the material will be in solution.

H. C. Stiefel, Ph.D., Chemist to the Pennsylvania Association of Master House Painters and Decorators, writes us: On a commercial scale the old rubber is recovered as follows: The material is shredded finely and then heated, under pressure, for several hours with a strong solution of caustic soda. All cloth (from hose, etc.), paints, glues, fillers, etc., in the rubber are disintegrated. The rubber is not affected. The "boiling" is then washed repeatedly with water to remove all alkali, the resultant pure rubber is then formed into sheets. The process can only be carried out profitably on a large scale.

—1041—

Manufacture of Sealing-Wax.

We can give a general idea only of what materials enter into the composition of sealing waxes, but cannot furnish a description of the newest methods employed in their manufacture, as these are kept well covered by those in the business.

The materials used in making sealing-wax are principally shellac and thick turpentine, also such resins as gum mastic, gum sandarac and gum benzoin for the finer qualities, while for inferior grades ordinary rosin and pitch are used. To hide the disagreeable odor of the burning resin, such sweet-scented oils as lavender, oil of cloves, oil of mace, oil of thyme, etc., as well as balsams, as for instance, balsam of tolu, balsam of Peru, etc. are added to the melted resins. For light colored sealing-wax, bleached shellac only can be used, other grades of shellac being good enough for brown and black only. Of thick turpentine, the grade known as Venice turpentine is to be preferred. The pigments used for giving the wax the desired color are of the greatest importance, as they must not change color, when the wax is brought in contact with the flame. For the finer grades of red, English vermilion, alizarine, red lake are employed only in the finest grades, orange mineral and red lead, and bright red oxide of iron in the medium grade, while commercial red oxide, brick dust and red bole are useful only in the cheapest commercial wax. Where the coloring pigments are very heavy, as in the case of English vermilion and orange minerals, such substances as chalk, terra alba, carbonate of magnesia may be added to extend the mass; and in order to make the colors of a paler shade, zinc oxide should be employed. The same applies in the case of all the pigments of heavy specific gravity.

For yellow, use chrome yellow with an extender for the finer grades and best French yellow ocher for commercial quality.

For green, the pure oxide of chromium or Guignot green would be the best pigment, but the cost of these being prohibitive, the maker is restricted to ultramarine green or a mixture of yellow and blue pigment.

For blue, ultramarine and copper blue are used for the light shades, and Chinese blue for the darker wax.

For brown, we have burnt umber and burnt sienna, Cassel earth or Vandyke brown, which give warm tones of brown and are comparatively cheap.

For black, the finest grade of lampblack or Frankfort black, with genuine ivory black for the very best grade, only are useful.

For white, nitrate of bismuth, also known as flake white, makes the best white wax, but is rather high priced, and zinc white is substituted for the commercial grade of wax.

So far as we know, the method of preparing sealing-wax has been as follows:

The resins and turpentine are first melted in suitable kettles, then the bulk making materials, such as chalk, etc., are stirred into the fluid mass and finally the pigments that give color. When the mass is to be perfumed with balsams or essential oils, these are added just prior to forming it into sticks or bars, as otherwise the scent would disappear through volatilization. When only one color is added to the resins, the foregoing method is the proper one to follow, but wherever a mixing of color is required to produce a certain effect, such as rose color, violet blue, or violet, etc., is desired, no whites are added to the resins in the kettle, but these are added to the dry color in a porcelain dish and well mixed, and warmed on a stove or hot plate, so as to mix more readily with the mass in the kettle.

The kettles used should be of cast iron, well enameled on the inside and the melting done as follows:—The shellac is first placed in the pot and fused under constant stirring with a flat paddle of hard wood. Then the turpentine is added and mixed with the shellac as intimately as possible. Finally, while stirring quickly and constantly, the pigments are added in a thin stream, and the stirring must be kept up until the mass is perfectly uniform, which may be tested by lifting the paddle and dropping a little of the mass upon a cold, smooth plate of metal, where it quickly solidifies and is then examined as to color, hardness and fracture. When found satisfactory, the fire is slowed down, the perfume added and the molding of the sticks proceeded with. The molds may be made of wood or brass and are composed of two parts, that are clamped together, when the melted wax is poured into them. For want of space we omit a description. We would say that a few trials will give a formula for any of the various colors of wax, and confine ourselves to giving a few specimens.

For a fine quality of red sealing-wax:—Twelve pounds bleached shellac, 8 pounds Venice turpentine, 9 pounds English vermilion, 2 pounds spirits of turpentine, 3 pounds carbonate of magnesia. For cheapest commercial red sealing-wax:—Two pounds shellac, 8 pounds N rosin, 5 pounds thick turpentine, $\frac{1}{2}$ pound spirits of turpentine, $3\frac{1}{2}$ pounds chalk and 6 pounds red lead. For fine black sealing-wax:—Eight pounds orange shellac, 6 pounds thick turpentine, 6 pounds D rosin, $2\frac{1}{2}$ pounds chalk, $2\frac{1}{2}$ pounds Frankfort black.

—1042—

Portland Cement.

Portland cement derives its name from its resemblance to Portland stone, when used as stucco on walls. The materials used in its manufacture are chalk, or any rich limestone, river mud, or clay and oxide of iron, the proportions of which vary from 65 to 80 per cent. of limestone and 20 to 35 per cent. of clay with iron oxide, which are intimately mixed with water in edge runner mills, then dried slowly on hot plates, afterwards calcined at red heat in a kiln, and reduced to a fine powder. The cohesive strength of the cement is greatly increased by extended storage in a dry place, and when using it, mixed with water, hardens rapidly. To use it in stucco work, it is still cohesive enough when mixed with three or four times its volume of clear sand, which must be entirely free from loam or it will not harden, but crumble to pieces when touched. Cement coated walls or stucco made with cement cannot be painted with oil paint, on account of the caustic lime in the composition, for a year at least, and even when exposed to the air for several months the surface should be treated with the washes described in the chapter on Painting Cement.

—1043—

To Cement Glass and Keep It Transparent.

A painter desired to know how glass in the form of diamonds is applied to glass for letters on signs, to have good transparency, durability and solidity.

The very best cement for this purpose is made by mixing 10 parts by weight of finely pulverized glass, 20 parts of finest powdered flourspar, with 60 parts of soluble silicate of soda of 33 degrees Be. The mixture must be made rapidly by stirring and when thoroughly made applied at once.

If this is too troublesome, make a thick solution of marine glue in wood naphtha. The glass must be thoroughly cleaned with soda and rubbed dry with chalk or whiting. The marine glue, in order to be transparent, should be made from one part india rubber and two parts pale gum copal dissolved in benzol.

—1044—

Hard Drying Cement for Iron and Tin.

A cement for iron and tin that can be kept in sealed packages for quite a time can be made by mixing into a medium stiff paste as follows:—Three parts of graphite, one part of powdered litharge and six parts of finely sifted iron borings, by weight, are mixed with a combination of one-third each by measure, of coach japan, cheap rubbing varnish and benzine. The paste is applied with a spatula in the same way as iron filler, pressed firmly into blow holes of other imperfections. There are numerous other formulas for iron and tin cements, but these can only be applied immediately after being prepared on the spot.

—1045—

Chopped Cows' Hair for Cement.

The best source for obtaining this is from tanneries. The cows' hair should be washed with soda water and dried. You may find that it does not require chopping. Probably the fiber used by the manufacturers of steam pipe covering would serve the purpose equally well.

—1046—

Testing the Binding Properties of Glue.

Good animal glue, when soaked in cold water, should swell considerably, should not discolor the water to any great extent, nor should it give off much soluble matter to cold water, and above all, it should not give off a disagreeable, sour or moldy odor.

Even when digested for twenty-four or forty-eight hours in cold water it must not become liquid enough to flow, but when heated at a temperature of 120 deg. F. it should dissolve and be thoroughly dissolved at 125 deg. F.

To test its binding properties there are various methods, but we shall give only the simplest one. One part by weight of glue, say 1 lb., and 2 parts by weight of water, say 1 quart, are heated in a glue pot on a steam bath, until the weight of the original mixture is reduced to 1¾ lbs. This is then tested in the following manner:—Hard or soft wood, 1 inch in thickness and 16 inches long, are cut in half, so that each piece is 8 inches long, and these pieces are glued together again at the point of separation and laid away for three days in a fairly warm place. On one of the pieces, 1 inch from the end, an eye bolt is inserted, to which afterward weights are attached and the pieces of wood fastened to a table, so that the joint is just flush with its edge; then the weights are attached to the eye bolt, and the joint should stand a weight of at least 150 lbs. before breaking if the glue is to be considered first class. The test should be begun with 50 lbs., and the weight increased 10 lbs. every minute, until breakage occurs. This, of course, is a test for joiners' glue, and if merely for painters' purposes we should say that the glue which takes up the most water in proportion is the best to select.

—1047—

Cement for Broken Plaster Casts.

Into a wide-mouthed bottle or glass jar place some small pieces of celluloid, sufficient sulphuric ether over these, and cork tightly. Shake the bottle or jar frequently until the celluloid is dissolved, let it rest awhile, then decant the clear liquid into another bottle and use the gummy portion in the bottom of the original bottle or jar as a cement, which will dry rapidly and is insoluble in either hot or cold water.

—1048—

Prepared Paste for Paperhangers.

We do not know of any prepared paste for paperhanging that we should care to recommend, but in the following you will find something that is portable, and will serve the purpose very well. Place one quart of water, as hot as the hands will bear, into a pail and add a tablespoonful of pulverized alum. Have best wheat flour sifted and put into the water, stirring it with the hand and work it as you would in making dough for bread until it is so stiff that you cannot beat it any longer. Have a clean paddle or stick and plenty of boiling water ready, which pour rapidly into the pail, stirring in the meantime until the paste begins to turn or cook; then stop pouring in water, but continue to stir the paste until cooked. Paste cooked too much will not hang, hence the pouring in of water must be stopped at the turning point, which happens when it begins to lose its whiteness. Level off the paste, pour cold water over the top and let it stand over night, when in the morning it may be cut into hunks that can be wrapped in strong brown paper and carried in the grip. On reaching destination, you can borrow a pail, thin the paste with water and it is ready for use.

Thick paste like this, before it is thinned, will not mold or sour for months, except in very hot weather.

In making this paste, as well as the ordinary ready paste, care must be taken to have it free from lumps.

—1049—

How to Prepare a Good Photographers' Paste.

We have been informed by competent authority that the best photographers' paste is made from common wheat starch, and would, therefore, suggest that you try the same. This paste must not be cooked, but prepared in the following manner:—Place a quantity of the starch into an earthen or porcelain dish, break up the lumps into a fine powder, and pour over it slowly boiling hot water, beating the starch with a wooden spoon or paddle into a soft batter, which, if there are any lumps, strain through cheesecloth or other coarse cloth. On cooling, the paste should have the appearance of lard; if too thick, thin with more boiling water.

—1050—

To Keep a Solution of Glue in Liquid Form.

Dissolve your glue as usual, and place it in a glass jar or earthen dish, and while still warm add to the solution one ounce of strong nitric acid for every pound of glue used in making the solution. Stir the acid in slowly and stop stirring when effervescence has ceased, allow to cool, and keep in a tightly closed vessel. To be in the right condition it must emit a smell as sour as ordinary household vinegar. For fine work, prepare your liquid glue by filling a wide-mouthed bottle a little more than half full with good white sheet glue and filling the bottle with white whisky or equal parts grain alcohol and rain water. Keep well corked.

—1051—

Paperhangers' Paste for Porous or Spongy Walls.

It was found impossible to make paper stick to some spongy walls, although glue, glue and sugar, glue, soap and alum, have all been used.

If you have sized the walls, as has been suggested repeatedly in these columns, there must be something wrong with your paste or you may not have employed the proper kind of paste for the sort of paper used. We would suggest that if you have not already done so, you apply a glue size to the walls, after rubbing off with coarse sandpaper any roughness or sand that may show. On this size apply lining paper, which may be had at any wall paper store, or ordinary thin wrapping paper; even newspaper will serve the purpose, using a good flour paste, made by making a batter of wheat flour and cold water, adding to this boiling water until the paste becomes nearly transparent.

If the paste does not lose its opalescence with the boiling water, boil up under constant stirring over a slow fire until it does so. Do not thin the paste too much for lining paper and keep out alum, but in order to increase its adhesiveness, add a few ounces of Venice turpentine or Canada balsam to one gallon of paste, while hot. This paste, without the turpentine or balsam, will also answer for strong or heavy paper, that may be put over the lining, but for delicate papers we should suggest a paste made from wheat starch, which must be made by pouring boiling water under continued agitation on the starch until the paste assumes the appearance and consistency of lard. Another important point worthy of mentioning is that while hanging paper no draught should be allowed in the room or hall until the paper on every part of the wall or ceiling is apparently dry. Draught will dry the surface of the paper very rapidly, while the ground is still wet and cannot resist the contraction on the surface, which causes the paper to loosen in some spots and shortly after the balance follows.

—1052—

Unshrinkable Molding Cement.

A formula was asked for a cement for molding small objects that require delicately fine lines of cast, such as engraved plates. It must be unshrinkable, harden quickly and resist pressure of heat.

For this purpose there is none better than Jannin's cement, so named after the patentee, a resident of France. It is simply a mixture of oxide of lead and glycerine, in suitable proportions to meet requirements. The yellow oxide of lead, known as massicot, is said to be most suitable, although other metallic oxides may be mixed with this in small quantities to suit the nature of the work in color. The quantity of massicot and glycerine required must be determined by the nature of the work and the consistency of the cement. The cement will set in a few minutes under the influence of gentle heat, and will then resist pressure and heat and will neither contract nor expand.

When set, the cement can be employed as a substitute for lithographic stones, and can replace them for many practical purposes. Will also serve for artistic reproductions, such as the fac-similes of terra cotta, whose color and sonorous quality it possesses.

—1053—

To Make Flour Paste That Will Not Liquefy.

The proper way to make the paste is to take two pounds best wheat flour and one pound of starch, mix each separately in cold water to a stiff batter, beating out all the lumps, then thin with more cold water to a pudding-like batter, mix the flour and starch batters in a pail; have some boiling hot water ready in which has been dissolved one and one-half ounces of alum, which pour on the batter gradually while stirring the mass vigorously until the paste swells and thickens, meanwhile turning darker. It is now cooked. Should by any chance the paste become too thin, it may be stiffened by cooking over a slow fire.

—1054—

How to Make Aquarium Cement or Putty.

The best cement for this purpose has been used with success for many years at the Zoological Gardens, London, and consists of the following:—One-half pint by measure each of finely powdered litharge, fine, white, dry sand and plaster of paris, and one gill of finely powdered rosin are intimately mixed with boiled linseed oil and some paste drier and beaten thoroughly into a putty-like mass, which is allowed to stand about four hours before it is used. But it must not be allowed to stand over twelve hours, as by that time it begins to lose strength. This putty will resist both fresh and salt water. It is best, however, not to use the tank or aquarium for two or three days.

Klein gives the following as a good cement for aquariums:—Mix equal parts by measure of sublimed sulphur, pulverized sal ammoniac and finest iron filings with a strong boiled linseed oil, then add enough dry white lead to make an easy working putty. Still another formula is to take six parts by weight of boiled whiting, three parts by weight of plaster of paris, three parts by weight of dry white beach sand, three parts by weight of fine litharge, one part by weight of powdered rosin and mix these ingredients with best coach varnish. We, however, do not recommend the use of this last formula, as we cannot see the advantage of using rosin in connection with coach varnish.

—1055—

Filling for Brass Signs.

A cement for filling the letters of brass signs may be made by mixing equal parts of asphaltum, shellac and lampblack. Black sealing wax will also answer the purpose. Apply by heating the brass plate, melting the cement in, then even up the surface with a warm iron. Then scrape off the surplus carefully and once more hold a warm iron over the letters to glaze them.

Another method is to mix asphaltum varnish, brown japan and lampblack to the consistency of putty, press this firmly into the spaces, then clean the edges with turpentine. When dry and hard, the whole plate can be polished.

—1056—

Aquarium Cement of the Best Quality.

Mix two heaping tablespoonfuls of finest powdered litharge with one tablespoonful of glycerine, which must be as viscid as heavy syrup. If you cannot obtain it of that consistency, you must evaporate the less heavy glycerine of commerce on a water bath, until it is viscid. Use same as any other putty.

—1057—

Cement for Filling in Brass Signs.

The best filling-in material is made by intimately mixing four ounces genuine asphaltum, four ounces brown shellac and four ounces dry lampblack. The asphaltum and shellac must be powdered, and the mixture is applied by heating the brass plate and melting in the cement. When the letters are filled, the cement is smoothed off with a fairly warm sad iron. When cooled off, scrape off the surplus carefully and hold a warm sad iron over the letters to glaze their surface. Black sealing wax will also answer this purpose, under similar treatment. If the plates cannot be heated, make an unshrinkable black putty by mixing equal parts by measure of genuine asphaltum, varnish and first-class coach japan and working into this enough dry calcined lampblack to make it very stiff. With this fill the spaces, pressing the putty well in with the putty knife, then clean the edges with turpentine. When the filling has become thoroughly hardened, polish the whole plate. The same method will answer for signs of zinc or copper.

—1058—

Waterproof Cement.

The following will stand heat and water:—

1. Take freshly calcined oyster shell lime, sift it well and grind fine. Make into a paste with white of egg. Apply to the fractures and press broken pieces firmly together.

2. Also boil four parts, by weight, of gum shellac and one part, by weight, of borax in water until shellac is dissolved. Keep on boiling until mixture is of paste-like consistency. When required, heat and apply to fractures with a clean brush.

3. Mix hydraulic lime and water glass.

(Nos. 2 and 3 will not stand heat, but will stand water.)

—1059—

Formula for Water Proof Cement for China.

Make a paste composed of hydraulic lime and silicate of soda (soluble glass). Make it just before use, as it will harden rapidly.

—1060—

Tenacious Quick-Hardening Cement for Stone, Wood, Metal or Glass.

The simplest formula we know of is to mix monoxide of lead, known as litharge or massicot, preferably the latter, which comes in a yellow powder, with enough glycerine to make a paste of the desired consistency and use it immediately after mixing. This cement may be colored by adding dry colors in small portions, but these must not be more than 10 per cent. of the quantity of the massicot or litharge used or it will prevent quick setting. Gentle heating will make it set in a few minutes and then it will resist both pressure and heat.

—1061—

Sulphate of Iron (Copperas) in Place of Glue for Sizing Plaster.

A solution of iron or zinc is used to saturate plaster in order to harden it and make it practically non-absorptive. The iron solution makes the plaster most resistant; it is claimed that it will make it twenty times as strong as that of ordinary plaster. However, when sulphate of iron solution is used, the plaster assumes the color of iron rust, while with sulphate of zinc it remains white. In either case, it must be a saturated solution—that is, it must contain all the sulphate of iron or sulphate of zinc that the volume of water will hold in suspension. Where the walls and ceiling are to be decorated in white or light tints we should be very cautious about using the copperas solution, at any rate, and either use the zinc sulphate solution or the old method glue size.

—1062—

Label Paste for Wooden Surfaces.

Dissolve five pounds of borax in nine gallons of hot water and when solution is complete add gradually, while stirring continuously, eighty pounds commercial dextrine in powder form. If the mass has cooled off somewhat, bring it up to a temperature of 95 degrees F. and keep stirring until the paste is free from lumps. This paste may be reduced with water to any desired consistency and will keep for a long time without becoming moldy or sour.

—1063—

The Preparation of Marine Glue.

In a suitable glass jar or stone jar with wide opening are placed 120 parts by weight of rectified petroleum. In a bag made of mull put 10 parts by weight of crude rubber in fine slices, and hang this bag into the jar, so that one-half of it is covered by the petroleum. Now close the jar tightly and set in a warm place for about two weeks, when the rubber should be well dissolved. Next melt 20 parts by weight of true asphaltum and add the rubber solution in a thin stream, stirring the mass meanwhile, heating until it is uniform, and pour it into tin pans that have been slightly greased with fat to keep the mass from sticking to the bottom and sides on cooling. When about to be used, this glue must be melted in a pot that sits in a larger pot of boiling water, so that it will not be burned. If melted or made liquid on a direct fire, it can be made more liquid than in the water-bath, but great care must be taken that it will not bake on sides and bottom of pot. All joints and seams on boats can be made water-proof indefinitely with this glue, hence its name. It is further useful for the joints of gas and water pipes.

—1064—

Cement for Use in Puttying Nailholes in Parquetry Floors.

The best and simplest cement we can recommend is probably Böttger's cement, which is made by stirring enough fine precipitated chalk into a solution of silicate of soda (water glass) of 33 degrees B., to make a medium soft paste that can be colored with pigments in powdered form and will become hard in six hours, when it will be unaffected by water or oil.

A brick house, built fifty to sixty years ago, was renovated three or four years ago. Bricks were painted one coat of oil and turpentine, and two coats of ready-mixed paint, a green shade. Another coat about one year ago. Paint now badly faded or bleached out in places all over the house, but worst on south and west sides. Spots are from two to three bricks to six to eight feet in area.

The faded spots are such as were not sufficiently saturated with oil when first done, and the addition of turpentine to the oil was wrong: for I take it that you mean the first coat was of oil and turps, no pigment. The thing to do now is to clean down the work, and touch up the faded places with a coat of raw oil with a little drier, and when dry a coat of oil paint. and when a gloss appears it will show that the place has been filled, then a coat of thin oil paint over all. Let dry, and examine for dead spots, which, should any appear, touch up, let dry, then another coat over all. This will likely make a solid job. The trouble came, in the first place, from a poor grade of bricks, or uneven texture, but the faded spots must have shown when the first two coats were applied, and should have been treated as outlined here.

A. Ashmun Kelly.

—1065—

Cement on Putty That Will Stand Hot Weather.

For iron bath tubs there is nothing better than a soft paste made by mixing finely powdered litharge with concentrated glycerine, but no more must be mixed than can be used inside of fifteen or twenty minutes, as it hardens rapidly and becomes as hard as stone.

If a putty for deep indentations is required mix two parts by weight of mineral brown, one part of powdered litharge and three parts fine iron filings, with enough strong boiled linseed oil to make the consistency of stiff putty. Must be well kneaded. For stone tubs mix twenty parts by weight of fine river sand, two parts finely powdered litharge, one part fresh lime, powdered, with boiled linseed oil to proper consistency for use.

—1066—

Ready for Use Liquid Glue That Will Not Mold.

Dissolve in a wide mouthed glass jar placed in a hot water bath eight ounces of best animal glue with one-half pint of water. When fully dissolved add while stirring the solution of glue and water, a teaspoonful of nitric acid of 36 deg. Be. until two and one-half ounces have been introduced. Keep stirring until all effervescence and fuming ceases, then allow to cool and bottle, keeping it well corked.

—1067—

Cement to Harden Under Water.

What is referred to is known as hydraulic cement and made in several ways. One of these is to mix three parts by weight of well dried and powdered clay with one part, by weight, of oxide of iron, the whole made into a stiff paste, like putty, with boiled linseed oil, in an edge rimmer mill or putty chaser, permitted to sweat or ripen a few days and then returned to the mill to be kneaded, as is the case with good linseed oil and whiting putty.

—1068—

Keeping Liquid Glue from Souring.

Add to each pound of glue that has been melted in say, one quart of water, ten to fifteen drops of nitric acid. Reduce the strength of the acid with ten times its quantity of water and stir it well into the liquid glue. Or in place of the nitric acid, you can use acetic acid, one-half ounce for every pound of glue used. Oil of cloves is also a good preservative as well as a perfume for liquid glue, but rather expensive. Alcohol also tends to keep glue from souring or molding.

—1069—

✓ Label Paste That Will Stick to Tin.

The best paste we have ever tried for that purpose is composed of six pounds best corn starch, 10 gallons water and four ounces of caustic soda. The starch is first beaten up with enough of the water to make a soft batter—beaten until all lumps disappear. It is best to strain the batter through a wire sieve. The balance of the water is heated to the boiling point, and all of this but one gallon poured on the starch batter while stirring. The caustic soda is dissolved in the remaining gallon of the hot water and added to the starch solution, which will thicken the latter and provide the adhesion to the metal. The hot paste should be stirred until nearly cool, then set aside and use cold. If it becomes too stout through evaporation, thin with lukewarm water. The figures given above will make 10 gallons of paste.

—1070—

Transparent Sheets of Glue and Sugar.

Transparent sheets of glue, gelatine and sugar. The idea is to dip a sheet of glass into the solution while fairly hot, and when cooled the film is to be peeled off the glass, to form a transparent sheet like isinglass. Wanted to know if we can propose the use of an acid or chemical to be applied to the glass before dipping it in the solution, in order to permit the film to come off readily.

In the first place, the sheet of glass should be cleaned very thoroughly with alcohol, the denatured article will do, and rubbed over with tissue paper; then, before dipping into the solution, a very thin coating of refined glycerine should be applied on the side from which the transparent film is to be removed, or on both sides of the glass.

—1071—

o Paperhangers' Flour Paste That Will Keep.

Formula for a permanent paste that will keep from souring or molding for a few months. Should be concentrated enough to be diluted with water when required for use and give perfect adhesion.

The peculiar advantage of a paste made by the following method is that it is made up quite thick, never becomes watery and sour, keeping at least three months, even in summer time, so that stock can be made up in any quantity. Here are figures for making a small batch for trial and, by increasing them correspondingly, larger batches can be compounded. In the top part of a granite-ware double cooker place one-half pound good wheat flour, one-half ounce each of powdered alum and borax, one-sixteenth ounce of boric acid and oil of sassafras. Mix with a square redwood paddle, adding one-half pound cold water, beating up the mass until all lumps have disappeared; then add two ounces acetic acid of 36 per cent. and boiling water, one quart, all at once; then place over the fire and heat to break up the starch globules, indicated by bluish tint and great adhesiveness, stirring constantly to prevent burning. Do not heat too long, as it keeps cooking somewhat after removal from fire. Place into a covered jar, and when wanted for use reduce the paste with boiling water, two parts to one of paste, adding the water slowly while whipping the mixture smooth.

—1072—

Keeping Paperhangers' Paste from Souring.

In our opinion, flour paste is best. Use sifted wheat flour in paste for delicate papers, rye for ordinary or dark papers. Make as usual and, in order to keep it from becoming sour, add to a pailful of the paste, while still warm, a teaspoonful of carbolic acid or 30 drops of oil of cloves. In order to make it stick well to a glossy surface, painted or varnished, leave out the alum in making the paste, but add to a pailful a pint of the best golden syrup, stirring it in thoroughly.

—1073—

Waterproof Liquid Glue.

Waterproof liquid glue that will stand the action of the weather can be made by soaking one pound of ordinary animal glue in two quarts of skimmed cow's milk over night and dissolving by heat afterwards. By adding fifteen to twenty drops of oil of cloves it will keep from mold or souring.

Ordinary liquid glue is made by soaking ordinary animal glue in water over night, melting it by heat afterwards. A small quantity of tannic acid dissolved in similar quantity of water, say two tablespoonfuls, will be sufficient for one-half gallon of liquid glue or, instead of that, twenty drops of oil of cloves will keep it from souring. This is better than the use of formaldehyde.

—1074—

Liquid Mucilage That Will Not Mold or Sour.

Add enough British gum (dextrin) to a quantity of hot water until a syrupy consistency is obtained, then add to a quart of this, while still hot, one-half teaspoonful of oil of cloves and allow to cool. This is the least costly preparation and excellent if the dextrin is in good condition.

A clear, almost odorless and permanent mucilage is made by dissolving gum arabic in a mixture of two parts lime water and eight parts of distilled water. This will not sour or mold. To keep mucilage from cracking or drying too fast add a few drops of glycerine to a small (say four ounce) bottle of the material.

—1075—

Cement for Broken Porcelain or Chinaware.

Make a thick solution of gum arabic, to which add enough calcined plaster (plaster paris) to make a mass of such a consistence that it may be readily applied with a small brush. Must not be too thick and applied to fractures, and the parts pressed firmly together, and if necessary so held with twine. When done carefully the articles can be put into use after three days, and will be found so well sealed that they will not break again at the mended parts of surface.

—1076—

Formulas for the Preparation of Liquid Glue.

For the following recipes a water bath is necessary and cannot be dispensed with. The kettle in which these mixtures are made should be glazed or enameled inside.

1. 100 parts by weight of gelatine, 100 parts pale animal glue, 25 parts 90 per cent. alcohol, 2 parts alum, pulverized, are warmed with acetic acid of 20 per cent. for 6 hours.

2. 120 parts by weight of animal glue, 10 parts acetic acid, 130 parts water and 1 part pulverized alum are warmed in the water bath until all the ingredients form a uniform mass, to which, when nearly cold, 30 parts of 90 per cent. alcohol is added.

3. 40 parts slaked lime, 60 parts sugar are dissolved in 100 parts water at a temperature of 70 centigrade; then 60 parts animal glue are added, and when the glue has softened the whole is dissolved in the water bath.

4. Diminuted glue is covered with acetic acid and for several hours heated in the water bath until a complete solution is had.

5. 500 grammes gelatine, 150 grammes alcohol, 500 grammes glue, 100 grammes alum in powdered form, 1,000 grammes 20 per cent. acetic acid are heated on the water bath for 6 hours.

6. One part glue is dissolved in 2 parts of fruit vinegar on the water bath.

7. A first-class liquid glue can be made without heat by mixing silicate of soda with one-fourth of its weight of sugar, which will answer as cement for broken porcelain or glass, if the parts can be held in place until the cement has dried hard.

—1077—

Frosting or Embossing Glass with Glue.

How to chip glass with glue, what kind of glue to be used and the consistency of the glue, when applied:—

There are three important points in the process, the most important of which is that the glass is properly prepared, i. e., roughened by the sand blast or by etching with acid. The next is the quality of the glue, and last, the temperature for chipping. In the absence of a sand-blast machine a hopper containing fine, sharp sand may be placed against the ceiling of a work shop, on the floor of which is a bench or low table, so that a fall 10 to 12 feet may be had. On this table the sheet of glass is laid flat and the sand from the hopper directed thereon for, say, about 5 minutes. If all of the glass is not to be chipped, then the side of the glass to be done should be pasted over with strong manila paper upon which the design or letters are previously drawn, and the part to be etched is carefully cut out and removed before the sand is directed upon the glass. The glass having been thus made rough the whole sheet of glass, paper and all, is covered with a stout solution of glue to the thickness of one-sixteenth of an inch, that is hot enough to spread evenly. The best glue is the sort known as noodle glue, so-called from its shape, but white sheet glue will also answer. Either should be soaked in clean water over night and then melted in the water bath with as little water as possible.

After applying the glue allow it to dry in the ordinary temperature of the room, which must not, however, be below 70 degrees F., if possible, between 75 degrees and 80 degrees F. Then the glass should be set in a rack in an oven or kiln in vertical position, the temperature being raised to at least 275 degrees F. and held for three or four hours, when the glue will flake off in irregular patches, taking with it a portion of the roughened glass, producing the effect of chipped or frosted work. Any remaining glue is scraped off with the spatula and the paper may be soaked off with warm water. Considerable practice is required to properly do the work. If the etching with sand is not convenient, the glass may be roughened by placing a border of asphaltum varnish around the edge of the glass, when it is to be chipped all over, or the design is put on the glass with asphaltum where the design or letters are to be left clear. Then the etching fluid, which may be white or French acid, or hydrofluoric acid, is poured over the glass, and when sufficiently roughened it is rinsed with clear water, and after drying undergoes the same treatment as if sand had been employed.

—1078—

Best Glue for Paperhangers' Wall Size.

Without question genuine white sheet glue is best for the purpose; that is, a glue that is unmixed with flour, starch or white clay or similar substances. You can find out whether it is pure glue by soaking it in cold water over night, and if the softened glue is fairly transparent and the water fairly clear, it is not mixed with the ingredients mentioned. Prepare your size as follows:—Soak one pound genuine white sheet glue (or gelatine) over night in as much cold water as will cover the glue or gelatine, then dissolve it in the usual way in a pot that is set in another pot with water, so that it will not scorch. When the glue is dissolved pour it into a vessel that will hold at least three gallons of liquid and immediately add two gallons of boiling water, stirring it in the meantime. If the size is to be kept for any length of time, add one-half gallon wood alcohol or denatured grain spirit, which will keep it from souring or molding. When used on a plastered wall that has been whitewashed or kalsomined, it should be applied warm; on plaster it may be applied cold. The addition of alcohol will aid the penetration and prevent the paper from emitting bad odor if walls should become damp from one cause or another.

—1079—

Excellent Paste for Labeling on Tin.

A French trade paper, *La Nature*, recommends for this purpose a paste that strikes us as being free from a tendency to produce rust spots on the most delicate labels. To be prepared as follows:—Two ounces of gum tragacanth in coarse powder are dissolved in one pint of boiling water. Must be stirred until all the gum has dissolved, then taken from fire and allowed to stand. In another vessel six ounces flour and one ounce dextrine are mixed with one gill of cold water, and when done the gum solution is poured into this while stirring. Now one and one-half pints of boiling water is added and the whole well stirred. Finally, when the mixture has become smooth one ounce refined glycerine and one ounce salicylic acid is added and the mass boiled four or five minutes longer, while stirring steadily.

—1080—

Flour Paste vs. Starch Paste for Paperhanging.

Flour paste dries out more elastic than starch paste, which is more brittle and liable to crack delicate papers in drying out on the wall. That is the reason for the preference given flour paste in hanging papers. Rye flour makes the most adhesive and strongest paste, but for some papers it is too dark, hence wheat flour is preferred in such instances. When flour paste becomes thin or

liquefies after cooking it is proof that it has either not been stirred sufficiently while boiling it; that it has been taken from the fire too soon, or that the fire was not slow enough for cooking the paste.

—1081—

Test for the Presence of Foreign Matter in Glue.

A simple method to determine the presence of filling or make-weight material in glue is to completely dissolve a portion of the suspected article and then thin the solution to the utmost. This should be placed in a jar of clear glass, well covered and set away in a room of temperate atmosphere, when any material that is insoluble in water will settle to the bottom of the jar. But if the glue is adulterated or extended with material that is soluble in water, such as dextrine, potato flour, sugar, etc., such admixture can be determined only by chemical examination or analysis. Only in the case of dextrine it is possible sometimes to detect its presence by its peculiar odor. That glue which is loaded with make-weight material, such as gypsum, whiting or barium sulphate, or that which is mixed with dextrine or potato starch is not as strong as the genuine article, is self-evident.

—1082—

Testing the Quality of Annual Glue and Its Proper Treatment.

We are well aware of the fact that there is scarcely any other material used in the painting trade to the testing of which so little attention is paid as to the purchase of glue. Another fallacy in the use of glue is that it is often prepared for use in an improper manner so that the best quality has really only the value that could be expected of the most inferior grade. If glue is heated to as much as sixty degrees Fahrenheit above its melting point, it has lost considerably in value. Glue in order to do the best work should not be more than ten per cent. in specific gravity over that of the water in which it has been dissolved, while in practice it is often used in a consistency of twice, even three times the necessary density. The necessary quantity of water should be placed in the melting kettle at the very start so that it does not become necessary to add more water during the melting process.

Glue should be melted only in a brass or copper kettle that should be provided with an airtight cover to avoid evaporation, the formation of crust and keep out dust, etc. This kettle should be set in another containing water in order to avoid overheating the glue. Always soak glue in cold water before melting, good glue taking up one and one-half to two and one-half pounds of cold water for every pound of weight.

Ground glue should be soaked at least four hours, while thin sheet glue requires twelve hours and thick sheets twenty-four hours. The soaking should be done in a separate container, not in the melting kettle. When thoroughly softened it should be placed in the melting pot or kettle with the amount of water required and heated to not higher than 150 degrees Fahrenheit. It is best to use the glue when required for joining at once after melting, but if kept at the above temperature it will be good in quality after several hours that is if the glue is of good quality originally.

Glue may be tested for quality as follows:—A thin sheet must bend until both ends touch one another without breaking. If after breaking a sheet of glue the fracture appears in splinters, the glue has not been cooked properly. If the sheet breaks too readily then the glue is weak in binding property and low in value. The surface of good glue should be velvety, but sometimes dust falls upon the damp glue and imparts a matty appearance. Sheet glue should be held against the light to determine its color, while ground glue should be examined through the magnifying glass. Never purchase glue that has been exposed to moisture, nor glue that emits an odor similar to that of dead animals. Irregular bubbles noted in melting glue when of large size prove that the material from which the glue

was produced had been in a state of decay. During the cooking glue of this sort emits a bad stench and is unfit for use. Even when soaking this glue before melting the disagreeable odor may be noticed and further proceedings are a waste of time and money, because when used for joining the joints will open up when the glue is decaying.

—1083—

How a Good Liquid Glue May Be Prepared.

The best liquid glue formula we know of consists in mixing 50 parts by weight of clear gelatine, 50 parts by weight of cabinet makers' best glue, 25 parts of alcohol, one part of alum with 100 parts of 20 per cent. acetic acid, heated in a water bath for six hours. This is good for joining to wood or wood to iron. For mending china, glass and earthenware, soak two ounces clear gelatine in four ounces of water. When the gelatine is well swelled add two ounces glacial acetic acid.

—1084—

Cementing Broken Articles of Terra Cotta.

Clean the fractured part by means of a dry brush from dust, etc. Dissolve good orange gum shellac in alcohol, say one part by weight of shellac to 7 or 8 parts by weight of alcohol. Apply this solution carefully to the fractures and let dry after every application. The first two or three applications will be absorbed by the pores in the fracture, but repeat until you have a film of about one-thirty-second inch or a trifle heavier on each fracture, but do not permit the last application to dry. Instead, apply a match to each of the fractures, when the burning alcohol will distribute the shellac evenly. As soon as this is accomplished press the pieces firmly together. As soon as the shellac becomes cooled the cementing is done and will even stand the weather.

CLEANING.

—1085—

Removing Paint from the Hands.

What will remove paint from the hands most readily, without injury to the skin?

To remove fresh oil paint, rub a little linseed or other vegetable oil on the hands first, then wipe off on a dry cloth or cotton waste, then wash the hands with common rosin soap, or soft soap and luke warm water, rinsing them out in clear water and dry thoroughly to avoid chapping of the skin in cold weather. To remove quick drying or varnish paint from the hands, wash them in deodorized benzine first, then rub any vegetable oil or fat over them, and lastly use rosin soap or soft soap, as in the case of fresh oil paint. When coal tar paint has been used and any portion thereof has got onto the hands, nothing short of light coal tar oil or heavy coal tar naphtha will effectually and quickly remove the spots, after which grease and soap should be used, as above. To remove liquid bronze from the hands, follow the method given for quick drying or varnish paint, except where the so-called banana oil has been used as liquid for the bronze, in which case nothing short of wood alcohol or amyl acetate will remove the spots quickly.

—1086—

Cleaning Painted and Varnished Surfaces.

In refinishing woods that were originally done in the natural, no matter how dark the finished surface appeared, the wood, after the old finish was removed, did not seem to have darkened. Hence it is apparent that only the varnish has blackened, and there seems to be no reason why all of the finish should be removed. Wood alcohol seems to clean varnish very well, but makes it soft and gives a poor surface to varnish over. Instructions along these lines were wanted, as well as for the cleaning of old paint, as a painted surface well cleaned will save at least one coat in repainting.

There is no doubt that when woods are finished in the natural the varnish and not necessarily the wood will darken in time, especially when varnishes that contain a good portion of drying oil are used on interior work. While wood alcohol will soften varnish or paint to a certain extent, it need not be permitted to remain on the surface long enough to soak through the entire film. Unless the wood alcohol contains a very large percentage of fusel oil, it will not penetrate very quickly, and even if the outer film softens somewhat, it will become hard enough again to permit a coat of varnish to be placed over it. All you need to do is to be careful to get an A No. 1 wood alcohol. Should you ever have any trouble on that score, go over the surface with pure grain alcohol. For cleaning painted work preparatory to repainting, we know of nothing better than to take warm soap suds and a good brush, scrubbing the surface and immediately rinse with clear water, using a good sponge. Avoid as much as possible soda or other strong alkalies, and at most add a tablespoonful of household ammonia to a pail of water. Use only good bar or ivory soap in making your soapsuds; do not use the so-called soft soap except for floors.

—1087—

Removal of Tarnish from Brass.

A solution of oxalic acid rubbed over the brass will remove the tarnish, making the metal bright, but the acid must be washed off with clear water, the brass dried with sawdust or cloth and then rubbed with precipitated chalk and a chamois skin or soft leather.

—1088—

Cleaning Fly Specks from Brass Fixtures.

If you cannot remove the fly specks by washing the brass articles with soap and warm water, using a soft brush for the purpose or a cloth, try to remove them with old ale. It depends very much on whether the brass has been lacquered or varnished, because in that case the specks are more difficult to remove. When lacquered or varnished, it is best to apply one or more coats of any good paint and varnish remover, because in this case soap and water or old ale is insufficient.

—1089—

Cleaning and Renovating Brass Chandeliers.

There are dozens of ways to remove fly specks from brass, bronze or other metals, the simplest being a wash of old ale, applied with a soft rag or sponge. To remove tarnish as well as fly specks, mix four ounces rotten stone with one ounce oxalic acid, that has been dissolved in a little water; add one-half ounce sweet oil and enough turpentine to make a paste; with which clean the brass, using a soft rag. When dry, rub the brass with a very soft cloth, flannel is best, but do not touch the metal again with your bare hands or fingers, and coat the brass work with a thin solution of orange shellac varnish, to which you may add a trifle of gamboge or dragon's blood in alcohol, which will enhance the beauty of the polish. The so-called "banana liquid," that is sold as a bronzing liquid, will serve the same purpose if a little dragon's blood, dissolved in alcohol, is added.

—1090—

To Restore Color and Finish to Embossed Russet Leather on Furniture.

Russet leather can be cleaned with lemon juice or ordinary vinegar and the finish restored by rubbing banana skins over it and polishing with a soft rag. The russet leather dressings sold in shoe stores are the simplest things to use.

—1091—

To Revive Old Oilcloth.

The best way to revive an old oilcloth is to give it a coat or two of good floor varnish; then you put the wear that would otherwise go on the cloth onto the varnish surface.

The Veteran Painter.

—1092—

To Make Soft Soap.

In many households there still exists a rule to collect all sorts of fat, from which, when sufficient has accumulated, soft soap is made by the following formula:—Into a strong barrel twenty-five pounds of potash (granulated or broken in small pieces) are placed, and on this four and one-half ordinary sized buckets (pails) of boiling water are poured. After stirring well the barrel is covered with a cloth and permitted to stand over night. Then three and one-half pails of this lye are taken out and placed in another barrel and thirty pounds of fat is made hot over a fire and slowly poured into the lye, while stirring. Let stand for a few days, when soap will have formed; then add daily, until barrel is filled, on or two pails weak lye, which is prepared by adding enough water to the remainder of the potash lye in the original barrel. In this way forty-five gallons of soft soap can be prepared from thirty pounds fat and twenty-five pounds potash.

—1093—

Car Cleaning Soap.

On a certain trunk line with an Eastern terminal in Jersey City, cars shipped for repainting are washed with a soap made up from the following formula:— Soap stock, twenty-five pounds; sal soda, five pounds. Boil in water for about one hour; then add enough water to make fifty-five pounds of soap ready to use. Naturally, as in the case of all soaps containing a strong alkali base, care and at least a reasonable common sense are necessary factors in safeguarding the employment of this soap. A practical paint shop authority has said of soaps that when any one of them contains more than a fraction of one per cent. of free alkali it should be forthwith condemned as distinctly dangerous for cleaning a painted or varnished surface.

—1094—

Cleaning Varnished Woodwork.

About two tablespoonfuls of strong ammonia to the pail of water is the best cleanser for paint and varnish I know of and will make it look like new. The railroad painters ought to try it when they wash down their stations. It would save them a good many coats of paint and keep the building looking better, too.

The Veteran Painter.

—1095—

Cleaning Varnished Surfaces.

How can varnished surfaces, that have become dingy from dirt and smoke, be cleaned before revarnishing? The work is five years old and the wood consists of cypress, pine and oak, all done in the natural.

Make up a thin batter by wetting up finely pulverized chalk with a solution of soda or potash, apply with a fiber brush, scrub and rinse with clear water. Mop up with a sponge and allow to dry. Sandpaper any rough places, where the varnish may have perished more than on others and touch these up first with thin varnish, before going over all of the surfaces.

—1096—

Handy Means for Removing Spots, Etc., from Furniture.

The most convenient furniture cleanser and polish we know of is a mixture of two tablespoonfuls of olive oil, one tablespoonful of strong vinegar and one-half tablespoonful of spirits of turpentine. Applied with a cloth, it will remove any spots of dirt, etc., and when afterward rubbed with a soft cloth, a good polish will result.

—1097—

Cleaning Woodwork Finished in White Enamel.

Procure some of the finest whiting to be had, precipitated French chalk entirely free from grit is best; provide yourself with warm water and a piece of soft flannel, which dip into the warm water and squeeze nearly dry, then take up with it as much of the whiting or chalk as will adhere to the flannel and apply it by moderate rubbing to the enameled surface. When this has taken off the dirt and grease, wash the surface well with clear water and rub dry with a soft chamois skin. This method of cleaning is far better than soap, as it does not deaden the polish, nor does it scratch the surface. Neither does it require as much time and labor, as the use of soap or ammonia water and repolishing is not required. Before proceeding to use the cleansing material referred to, care should be taken to have all of the surface thoroughly dusted, not neglecting corners and moldings.

—1098—

Cleaning Spots Off a Buggy After Washing.

What should be used to brighten up the varnish of a buggy after washing and what will remove spots also on paint not varnished?

To clean the parts of a buggy that has not been varnished, take some of the finest whiting to be had or French chalk, dip a piece of flannel into clean warm water and squeeze nearly dry, then take as much whiting or chalk and apply to the surface by rubbing briskly. Wash off with warm water and dry the surface with a soft chamois skin. This is better than using soap, as it will not injure the paint and will help make it look like new. For varnish follow the same course, but use precipitated or French chalk mixed with a little soda or potash dissolved in warm water. Remember, however, that in rinsing off the water must not be allowed to dry on the surface. Also that if mud spots are allowed to remain too long on the varnished surface before washing they cannot be obliterated, especially those made by mud containing lime.

—1099—

Removing Grease, Oil or Paint Spots from Blackboards.

The most rapid, but also most expensive, way to remove oil or paint spots from slate blackboards is to mix equal parts of amyacetate (pear oil), bisulphide of carbon and fusel oil, applying this mixture with a sponge to the spots, which will disappear under this treatment in a very few minutes. Strong ammonia will also remove the spots, if applied repeatedly. This treatment is for slate boards only. For painted blackboards it is too strong, as it would remove the paint. For such boards a solution of four ounces of pearlash (carbonate of potash or salts of tartar) in one quart of boiling water, to which three ounces of dry, freshly-slacked lime is added, is best. When the solution has become cold, the clear liquor is poured off and placed in a well-stoppered bottle of green glass. To use it on blackboards, dilute with its own quantity of water and scour the spots with it quickly, then wash with clear water.

—1100—

Marble Cleanser and Polish.

Dissolve four ounces of sal soda in as little water as possible. Mix with this solution two ounces flour of pumice and two ounces fine chalk or whiting, so as to make a paste. If it does not mix with the soda solution, add sufficient water. Rub the marble well with this, using a coarse cloth, then wash with soap and water. A fine polish should be so obtained.

—1101—

Ox Gall for Taking Stain from Marble.

The fresh ox gall as furnished by the beef butchers is best, and equal parts by weight of it, pulverized soap and pipe clay (kaolin) are mixed with enough turpentine to produce a thick paste, which is put over the stain in a heavy layer, which, when dry, is removed and the spot washed with warm water. Prepared ox gall has not the proper strength.

—1102—

Removing Oil Spots from Tile.

A painter while doing some work in a house, left some paint pots standing on the tiled floor of the vestibule, which caused oil stains on some of the tiles. Muriatic acid does not remove the stains, and although chloride of lime did so temporarily, the stains again became visible.

We cannot vouch for the success of the following treatment but it has been highly recommended for taking oil stains from marble:—Take equal parts by weight of ox gall, pulverized soap and powdered pipe clay, knead the mass together with turps. Apply a thick coating to the stained surface, and when thoroughly dry, rub it off and wash the spot with soft, warm water. A second application may be necessary. Common clay ground to a thin paste with benzine, applied to marble or tiles in a thick layer will also take out oil stains.

Also one part of soft soap, two parts fuller's earth and one part of potash, all by weight, mixed with boiling water to a paste and applied to the oil spots will remove them in from two to three hours.

Lay over a coating of soap fluid enough to penetrate the tile, and after a few hours lay on a piece of linen folded several times, which has been saturated with a strong solution of cream of tartar or common washing soda; then remove by scrubbing and wiping dry. Repeat the process until all the oil is extended.

H. C. Standage.

—1103—

Cleaning Hard Pressed Brick.

How can hard pressed red brick be cleaned that has been discolored by water running from galvanized roof gutters over the brick?

Mix with one-half gallon of softsoap two pounds ordinary pumice stone F or O and one-half pint eighteen degree ammonia, stir thoroughly and apply to the stained brick, let the solution stay on for about thirty minutes, then with an ordinary scrubbing brush rub it briskly, then wash off with clear water, using a large sponge. If this does not remove the stain, then make a paste by dissolving two ounces oxalic acid in one quart of hot water, add one ounce butter of antimony (antimony trichloride) and mix with it enough flour to make a paste, which apply with a brush like a stout paint, let it remain at least two days, then wash off. The discoloration is, no doubt, due to rust. Lampblack in oil, that has become dry, may be taken out of brick by slaking three parts by weight of quicklime in water and adding to the slaked lime one part by weight of pearl ash or soda ash, making the mass the consistency of soft paste. Put this on the lampblack with a common fiber brush and let it remain for about twelve hours, then scrape and wash with clear water.

—1104—

Cleaning Yellow Pressed Bricks from Stains and Smoke.

Slake fresh burnt lime to a plaster by sprinkling water upon it, and pour the powder through a sieve. To 100 parts of this powder add sufficient water to form a thin milk of lime, and boil it in a copper boiler, and add one part of bichromate of potash. Separately make a thin paste of sulphate of lead in water and stir it in the boiling mixture (sugar of lead or nitrate of lead can be substituted for the sulphate, but they are crystallized lead salts which dissolve in the water), color the mass with sufficient yellow ocher to match yellow bricks, and then add cold water to the mass and pass it through a fine wire sieve, drain it off through linen or cloth bags, and when sufficiently pressed, break it in pieces and dry in the air. For use, mix with water like whitewash and lay on the bricks with a brush.

No. 2. Soak two ounces of good glue for twelve hours in cold water, and dissolve it by constant stirring, in thick milk of lime (prepared from one pound of caustic lime) heated to boiling point. To the boiling glue mixture add linseed oil until it ceases to mix; about eight to nine fluid ounces of oil is sufficient for the above proportions. Too much oil is corrected by the addition of lime paste. Mix the above with any color not affected by lime, and diluted with oil or water according whether the compound is to be used as a water or oil paint.

H. C. Standage.

—1105—

To Clean the Caned Seats in Chairs.

Turn over the chairs, and with sponge and very hot water rub off the caned part. See that the cane takes up all the water possible, then place the chairs in free air or in a well ventilated room to dry, when the seats will look like new and may be coated with white shellac varnish.

—1106—

Cleaning Brass Before Ruffing.

This, when done on a large scale, is accomplished with revolving brushes, but to do it occasionally only and in a small way, we would recommend the use of a paste made from one-half ounce oxalic acid, powdered, three ounces of powdered rotten stone and one-quarter ounce pulverized gum arabic, mixed with sweet oil. Apply and rub on the metal well with a stiff brush and wipe dry with woolen cloth.

—1107—

Cleaning and Relacquering Brass Chandeliers.

We need hardly dwell upon the well-known fact that the first essential is and everything depends upon having the brass free from grease and dirt. Unless you are very careful on this point you will never be able to obtain good color for this class of work. The chandeliers should be taken down and taken apart and the parts boiled in a strong solution of pearlash until apparently clean, then placed into a vessel containing a solution of one part of aquafortis to four parts of water, letting them remain in this solution for about one hour, when they should be washed or scoured in clear water with a brush until every part is clean. Now make up a solution of equal parts of nitric and sulphuric acid and add to this about one-third part of nitric acid in which has been dissolved some zinc in the proportion of one of zinc to three of acid. When this mixture comes to a boil, dip in the parts until they acquire the color you want; one-half minute will usually do it. Rinse the parts well in clear water and dry with sawdust. Do all this work out of doors on account of the fumes of the nitric acid. When dry, rub the parts with soft rags and leather, and when heated sufficiently apply the lacquer. A good lacquer is made as follows:—Bleached shellac, 8 ounces; gamboge, $\frac{1}{2}$ ounce; aloes, $1\frac{1}{2}$ ounces; alcohol, 1 gallon.

Place the ingredients in a well-corked bottle and shake occasionally until dissolved, then strain through cheesecloth.

Lacquer the exposed parts only, and in applying the lacquer use only the very tip of the brush and do it with a steady hand. Before lacquering, handle the parts with a piece of clean cloth, and never handle lacquered work until entirely cold.

Remember that the brass must be heated before the lacquer is applied, but not to such an extent that the lacquer is burned.

—1108—

To Clean Off Smoke from Plaster Paris Ornaments.

The simplest method is to make warm soapsuds, to which a little ammonia is added, say one tablespoonful of household ammonia to a quart of the suds, and apply to the ornaments with a soft brush. When clean and white, rinse thoroughly in clear water. If this treatment is not effective enough, make milk of lime (a little air slaked lime in water, which has the color of milk) and immerse the ornaments or figures in this for some time; then wash with clean water, and when dry, dust on some fine French chalk with a painter's duster or blender.

Benzol and spirits of turpentine are also highly recommended for cleaning plaster ornaments, but we should prefer to use the soapsuds to any other treatment.

—1109—

Cleaning of Painted Walls.

Plastered walls that have been painted can be cleaned satisfactorily, providing the paint has not begun to perish. In cleaning a painted wall it is best to have two men working together—one following the other. In this way there is not so much risk of spotting or streaking. A stretch of three or four feet is as much as should be done at a time. First dampen the wall with a sponge that has been saturated with clean water; follow this with soap suds, made from castile soap and warm water, applying same with a kalsomine brush, scrubbing lightly. When the dirt has been softened in this manner, scrub with a solution made by boiling the shavings of one pound of castile soap in one-half gallon of water, stirring in two pounds of fine bolted whiting, and allow to cool. Dip the brush into this mixture and scrub, taking care not to scrub harder than is required to remove the dirt. Sponge off immediately with clean, soft water and wipe down with a wet chamois that has been wrung out. Avoid using too much water, but wring out sponge and chamois as often as possible, and change the water quite frequently. Always begin at the bottom and work up. Ceilings are cleansed in similar manner, and when the walls or ceilings are smoky a little household ammonia added to the soapsuds will add to the efficiency in removing the dirt.

—1110—

How Old Gilt Frames May Be Cleaned and Renewed.

Old gilt frames may be cleaned by simply washing them with a soft sponge of suitable size wet with urine, hot spirits of wine or spirits of turpentine. The sponge must not be too wet, simply damp enough to take off the dirt and fly-specks. The frames must not be wiped dry, but allowed to dry of themselves. If this does not make them lustrous enough, the frames must be regilded, which is done by making some thin size from parchment and mixing some of this warm with water gold size, which is applied with a camel's hair brush in two coats. When dry, it is rubbed down with very fine sandpaper and is then ready for gilding. When the frame is covered, set it on its edge to drain. When perfectly dry, dip a pencil into water and wipe the gold over with it, which will take the surplus particles of gold off and make it appear solid. For any parts not covered, take bits of leaf with a dry pencil and lay on as before, then give the whole a coat of clear parchment size, brush the back edges over with ocher and the frame is ready.

—1111—

Cleaning Violins and Violin Bows.

For cleaning of violins, saturate a piece of soft silk with ordinary paraffin oil and proceed to wash the violin with it. The effect is a quick one; the paraffin dissolves the crust of dirt and rosin, cleaning the varnished surface without injury.

For the bow, take a small piece of flannel, wet with cold water, and rub it well over with yellow soap, double it, holding the hair between the finger and thumb, rub gently until clean, using plenty of soap; then, rinse out the flannel, wipe off the soap, then wipe dry with a piece of soft muslin or linen. In an hour the bow will be ready for the rosin. The polished back of the bow may be cleaned with paraffin oil.

—1112—

How Sea Shells May Be Cleaned and Polished

There are several ways to accomplish this. First, boil in a strong solution of potash, then polish with hydrochloric acid and whiting.

Second, clean the surface with hydrochloric acid until the outer skin is removed. Wash in warm water and dry in sawdust, then polish with chamois skin. If the shell has no natural gloss, rub with tripoli and turpentine, using chamois skin, and finish with olive oil.

Third, rough shells are first ground on a coarse stone, then smoothed with pumice and water on a buffer wheel or with a hand polisher and finished with rotten stone.

—1113—

How the Brightness of a Tiled Floor Is Retained.

The addition of a half pint of kerosene oil to an ordinary bucket of water will give the best results as to bright appearance when the mopping is carefully done; but the addition of aqua ammonia and spirits of turpentine, say four tablespoonfuls former and two tablespoonfuls of the latter to a three-gallon bucket of water, will leave the tiles both clean and bright, even if the mopping is done carelessly. Under no condition should soap or strong soda be used, because tending to give the tiles an unsightly, dull appearance in a short time.

—1114—

Liquid Brass Cleaner and Polish.

Most polishes are made in paste form, and there are legions of them in the market; but if you must have it in liquid form we would recommend the following as most effective:—Dissolve one ounce of oxalic acid in one gill of hot water and stand aside to cool. Mix four ounces of rotten stone, finely powdered, with one-half ounce of dextrine that is also powdered very fine, and two ounces of sweet oil or palm oil to a paste, into which stir the oxalic acid solution. If too thick to form a liquid, add more water. Apply with a rag or sponge and rub dry with a piece of flannel or wash leather.

—1115—

Cleaning and Renovating Oil Paintings.

To clean and restore oil paintings a very good method is to cover them with wet cloths for three days, changing them twice daily, and washing them at each change. When clean and dry, rub the painting over with a soft cloth, saturated with nut oil.

Another method is to clean the painting thoroughly and then glaze it over with a good mastic varnish, made as follows:—Dissolve 14 ounces gum mastic in three pounds spirits of turpentine in a water bath, and then add two ounces clear Venice turpentine or Canada balsam. Put into a flask or jar and add one-half pound powdered glass or quartz. Shake thoroughly and allow to clear by settling. When clear, decant and apply with a soft varnish brush.

—1116—

Cleaning Brick Walls That Have Become Spotted with Mortar.

Knock off the lumps of mortar with a scraper, also scrape off the mortar spots, where they are heavy, and remove balance by sponging with a mixture of equal parts commercial muriatic acid and soft water, which will soften and

remove the mortar. Finally wash down with clear water. This proceeding will also remove the white efflorescence, as well as dirt from bricks, making them look like new.

—1117—

Kerosene as a Grease Remover, as Against Turpentine or Benzine.

Is kerosene as efficient for removing grease from surfaces before painting as turpentine?

While kerosene will remove grease it does not do it as well as spirits of turpentine, because it is greasy itself, while turpentine is not. To illustrate this, take a piece of white paper and place a few drops of kerosene oil thereon and on the same piece of paper as many drops of pure spirits of turpentine and hang it up on a nail or file. Within seven minutes, if the turpentine is pure gum spirits, the mark made by it on the paper will have disappeared, while that made by the kerosene will remain as a grease spot. You can readily see what is liable to happen if you paint over a surface that you have recently cleaned off with kerosene. It does not give you a surface to which paint will properly adhere. Pure spirits of turpentine is too expensive an article to use for cleaning off grease, but there is a very cheap and effective medium which will not cost you much more than kerosene, namely, petroleum benzine or gasoline. Gasoline, of course, is a risky material to keep about a paint shop, as it is the most gaseous of the petroleum products, but benzine, or, as it is often called, naphtha, is not quite so volatile, and some grades will not evaporate as quickly even as turpentine, but the ordinary benzine sold at 58 deg. or 62 deg. Baume will not cost you more than kerosene and is as effective as turpentine for cleaning brushes or grease off any surface and not as dangerous as gasoline. It can be kept in a cool place, securely corked, and if kept away from open flame there need be no anxiety. Any petroleum company of your locality will be able to supply you with the goods of the right degree at a reasonable price if you purchase in sufficient quantity.

—1118—

Lye Water for Cleaning Paint Pots, Strainers, Etc.

Place into the barrel to be used ten pounds of quicklime, same as you would use for making whitewash, wet it with hot water, then cover the barrel with a bag or piece of old carpet until the lime has fallen into powder. Then add more hot water, but only enough to slake the lime. This done, add ten pounds of soda ash or pearl ash and enough water to make thirty-five gallons. Stir the contents of barrel several times and let stand over night, covering it, however. If you cannot readily obtain the soda ash or pearl ash use instead five pounds concentrated lye or saponifier. In case you cannot obtain this, use five pounds caustic soda or caustic potash. In this solution place your paint pots, paint strainers—in fact, anything in metal—from which you wish to remove hard paint. When the solution becomes weak in time pour off the liquid, remove the sediment from the barrel, return the liquid, add more concentrated lye or caustic soda and enough water to make the original amount, and it is fit to use again.

—1119—

Cleaning Stone and Brick Work.

If the walls are simply stained by soot from smoke and by dirt, the very best plan is to simply wash them down with scrub brushes dipped into soapsuds, to every two-gallon pail of which has been added a pint of 16 degrees liquid ammonia, and then rinse with clear water liberally. If, however, the stone or brick walls are stained by smoke, which is too stubborn to yield to the soap and ammonia water, proceed as follows:—Take good yellow bar soap, slice it into

small chips and dissolve it in enough water to make one gallon soft soap by boiling, stir into this, while warm, two pounds of pulverized pumice stone, 00 or F, and one pint liquid ammonia of 16 degrees strength and when the mixture has cooled, apply to the wall with a fiber brush, let it remain on the wall, say twenty to thirty minutes, then scrub with stiff brushes until wall is clean and rinse with clear water.

—1120—

Cleansing Material for Frescoed Ceilings or Walls.

The following is an effective yet harmless method of cleaning frescoed walls or ceilings that is inexpensive at the same time:—First clean the ceiling from dust thoroughly. Procure finest bolted whiting (chalk) that is perfectly free from grit, put it into a dish or pan, wring a piece of flannel out of lukewarm water, until almost dry, dip into the powder and rub over the surface to be cleaned, taking a few square feet at a time. Wash with clear water, using a sponge, and wipe dry with a soft chamois leather. Several men should work together, one to do the rubbing, the other the washing and drying. This method will not injure the most delicate fresco work.

Another plan is to slice down one pound best brown oil soap, not too alkaline, and dissolve it in three quarts soft water over a slow fire, but not allowing it to boil, adding one ounce pulverized borax. Use with soft flannel cloth, rubbing it over the surface until clean, but rinse or sponge immediately with clear warm water and dry with chamois leather.

—1121—

Taking Stains Out of White Marble Table Tops.

To clean stained white marble without destroying the polish make a paste of equal parts by weight of ox gall, powdered soap and pipe clay or fine china clay, mixing with turpentine. Apply a thick coating to the stained marble and when the paste becomes dry rub it off and wash the marble with warm water. If badly stained a second application will be required.

—1122—

Removing Grease Spots from Concrete Floors.

Mix 15 parts by weight of pipe clay or china clay with 10 parts of yellow soap and 8 parts of pearlash with enough solvent naphtha (coal tar benzol) to make a thin paste, which apply in thick film over the grease spots, and when dry, remove with a spatula. Repeat the application as often as is required to extract the grease, then wash with benzine, if there is no open flame near the place, otherwise use liquid ammonia and water. This, of course, refers to unpainted concrete floors.

—1123—

Liquid for Cleaning Varnished Floors.

The most effective, yet harmless, cleansing liquid for varnished surfaces of any kind is soft water, to a pailful of which two or three tablespoonsful of strong ammonia is added. But for a varnished floor that is subject to constant and severe use one part of muriatic (hydrochloric) acid by volume to eight parts of water, also by volume, is more effective than the dilute ammonia. In either case, however, after the floor has been scrubbed with these solutions, a thorough rinsing and mopping up with clear water is necessary. To clean and polish a varnished floor in one operation use a liquid composed of one pint raw linseed oil, one-half pint strong household vinegar and one-quarter pint spirits of turpentine, to be applied with a floor brush and wiped up with a cloth that

is wrapped about the brush. If gone over briskly with another clean cloth on the weighted floor brush a fine polish will be had. The vinegar is the cleanser, while the oil acts as lubricant and the turpentine, in conjunction with the latter, as the polisher.

—1124—

Cleaning Tapestry and Tekko Papers.

Method to clean tapestry that is stretched on battens about the upper part of wall and above radiators, and which is in apparently smoky condition. Also method to clean a room that has been hung with tekko around base, windows, and door frames. The tekko has been soiled by the women about the house when washing off the woodwork.

If you refer to genuine tapestry and not to the cheaper grades, that go under that name, then the following method will be successful:—Dissolve a bar of good soap, not too alkaline, in one gallon of boiling water and set aside to cool. When cold, stir one quart of this soft soap into one gallon of cold water. Have ready at hand a few pieces of soft white flannel, a soft brush, a piece of chamois, and some clean, dry cloths. First well brush the tapestry with a hard, long-haired clothes brush, taking care to get all the dust out of corners; for this purpose use a small, pointed brush and a pair of small bellows. Always begin on the top and do not attempt to do more than a yard at a time. Dip a piece of flannel into the soap liquor, squeeze out gently and well rub into the tapestry to produce a lather, which brush with a soft brush. Then wring the flannel out of the soap liquor and dry the space with the soapy flannel and the chamois, and afterward with the dry cloth. The tapestry must dry with the soap in it, as under no consideration must it be rinsed. Then dissolve four ounces of tartaric acid in a pint of boiling water and put it into a receptacle containing two gallons of cold water. Dip a clean sponge into this acid water, squeeze it, and rub it over the spot you have just cleaned and dried. When this is done, it must be gone over again with the dry cloths. Go on in this way, doing about a square yard at a time, until all is done. Every time the soap liquor becomes dirty, it must be thrown away and a fresh lot used. When all of the tapestry has been cleaned, and is quite dry, take a lump of pipe clay or fine kaolin, rub over it and brush with a good clothes brush. This last process removes the soap and brightens up the colors. Have a good fire or plenty of steam heat in the room while doing the job.

As to your query about the soiled tekko papers, we are afraid that you can do nothing with them. Even the genuine Swiss tekko papers cannot stand wiping with anything stronger than a damp cloth without injury, and if they are soirettes, which resemble tekkoes, then they cannot even be wiped with dampened cloths without risk. We think you will find that the scrub women used soap with their water in cleaning the woodwork, or, at least, that the dirty water soiled the tekko papers and there is no remedy in that case.

—1125—

Touching Up Worn Leather on Furniture.

Place in a wide-mouth glass jar of sufficient size one-half pound orange gum shellac, one-half ounce Venice turpentine, one-half ounce gum sandarac and one-quarter ounce castor oil, two and a half pounds 95 per cent. spirits of wine (denatured grain alcohol will do), one-quarter ounce nigrosine (aniline black) and three-quarters ounce azo eosine or Rhodamine G. If, when all is dissolved by placing jar in warm water and shaking occasionally, the color does not match the leather, add more of the black or the red, as the case may be. Try it on a small scale first by using grains instead of ounces. If color is right, the lacquer should be strained while warm, then allowed to cool, and set aside for use in a well stoppered bottle.

—1126—

Cleaning Light Yellow Bricks Discolored by Dripping Water.

If the surface referred to is stained with soot and dirt, in addition to the water stains, clean down first with soft scap and pumice, using scrub brush and sponge, rinsing with clear water. Then take a rubbing brick, such as is now used by carriage or car painters, or sandstone of very fine grain, and rub over the stains, using liberally soft water in a pailful of which has been dissolved one-half pound oxalic acid. When surface has been well rubbed in this manner take a large sponge and clear water to clean off. Rinse the sponge again in more clear water and finally wipe with sponge well wrung out of the water. The rubbing brick referred to is largely used in place of lamp pumice stone and is known as Schumacher's Rubbing Brick.

—1127—

Removing Machinery Oil from Cement Floors.

To clean the cement floor of a large power house from the mess made by the oil that flies from the engines when running. Would like to restore, if possible, the natural color of the cement.

Caustic soda in boiling hot water applied on the surface, liberally and scrubbing with long-handled stable brooms of strong fibre is the only sure way to remove the grease, but the natural color of the cement will not be restored by such treatment, as the oil has, no doubt, penetrated rather deeply into the pores of the surface. If convenient, you might soak sawdust in the caustic soda solution and place it on the floor about two inches thick, wetting with more of the solution and permitting it to remain over night, then scraping and rinsing the floor with hot water. The operators should wear rubber boots and rubber gloves.

—1128—

Cleaning Paint Stains from Cement Floors.

The best and cheapest means for removing spots of oil, paint or varnish from concrete or cement is to apply a paste made as follows:—Slake three pounds of quicklime (builders' lime is best) with enough boiling water to make it fall to pieces; cover the pot with a bag or piece of burlap to keep the steam in. In the meantime dissolve one pound of caustic soda or pearlash in enough hot water to effect a thorough solution and add it, while stirring, to the slaked lime. Do not make the paste too thin, but like a semi-paste paint, and apply over the spots with a fiber brush (not a hair brush). Leave it on for a few hours, then wash off with warm water and finally with clear water and mop. Protect your hands with rubber gloves.

—1129—

Taking Stains Made by Linseed Oil Out of Brussels Carpet.

We do not believe there is anything that will remove the oil without ruining the carpet. The oil surely has resinified by this time and partially or wholly destroyed the nap of the carpet. A soap or soap suds strong enough to resolve the oil would surely ruin the color of the fabric, while liquid quickly evaporating solvents like those used in paint and varnish removers are also liable to act in similar manner. You may try the following on a small portion of the carpet and see what success you have:—Cut up some laundry soap that is not very alkaline in small shreds and dissolve it in sufficient denatured alcohol, say two ounces of soap in one pint of alcohol. This should be done in a hot water bath, the temperature not to exceed 100 degrees F. As soon as soap is dissolved remove from water bath and quickly mix with one quart of 90 per cent. coal-tar benzol or solvent naphtha, which has also been warmed in a water bath (boiling hot water will serve the purpose, as there must not be any open flame).

Dip a suitable scrub brush into this mixture and rub over the carpet until a lather is produced; which leave on for about five minutes, then mop up with a sponge and wring sponge in lukewarm water. Go over the spot again and then rub with a soft dry cloth, taking care to rub with the nap of the carpet. If you do not succeed in this way on the spot tested you had best leave it alone.

—1130—

Cleaning and Staining Pressed Brick Fronts.

We are working on a red pressed brick front of a building where sparrows have been roosting, and have tried to wash off the traces left by the birds with all kinds of soaps, but without results. Kindly let us know of an acid solution that will remove the stains, and also give recipe of a brick wash or stain to renew the color.

Use what is known as builders' acid, commercial hydrochloric (muriatic) acid, diluted with its own volume of water, or, if necessary, full strength. Protect the hands with rubber gloves or gauntlets while using the acid with fiber brushes, and wash the surface immediately after with plenty of clear water. The simplest brick wash or stain is made by taking a Venetian red or red oxide of the right shade and mixing it into a medium stiff paste with ordinary water, then thin down this paste to the consistency of a stain with stale beer or stale ale. To every gallon of such stain you must add four ounces of calcined copperas (iron sulphate), which is green copperas heated in an unglazed earthenware dish, until it falls into a white powder. This is added so as to make the stain insoluble, otherwise rain would be apt to wash it off. In adding the calcined copperas to the stain rub it into a smooth paste with a little of the stain.

—1131—

Taking Stains of Petroleum Out of Marble.

How to take out stains that have been made with rubbing oil on marble. The marble is white Colorado and very easily spotted. The rubbing oil used is non-drying:—

Your rubbing oil is most likely crude petroleum, which is most commonly used for the purpose. If this is the case, the stains in the marble are best extracted by saturating pulverized pipe clay, fuller's earth or whiting with benzine and place a layer of this mass over the stain, letting it remain until it has become almost dry. Then remove, and if stain is still there repeat the operation.

Another effective means is to mix three parts, by weight, of soft soap, six parts fuller's earth, and three parts of potash with enough boiling water to make a thick batter that is applied in a heavy layer to the stain and left on for two or three hours.

Still another method for extracting oil stains from white marble is to make a mixture of two parts, by weight, of sal soda, one part chalk and one part powdered pumice, all ground together in water and applied as a paste, which when dry, is removed and the spots washed off with soap and water.

—1132—

Cleaning Tarnished Gold Letters on Signs.

A harmless gold detergent is made as follows:—Slake one ounce of quick lime in a little hot water, then gradually add 20 fluid ounces of boiling water to form a milk of lime. Then dissolve in another vessel two ounces of pearlash in 30 fluid ounces of boiling water and mix the two solutions, covering up the vessel for about one hour, occasionally shaking it. When cooled decant the clear liquid and apply it to the gold leaf with a soft sponge until clean, then rinse.

Another detergent is prepared by dissolving 7 ounces bicarbonate of soda, 7 ounces chloride of lime and 2 ounces common salt in one and one-half pints of

distilled or filtered rain water, to be kept in a well stoppered glass bottle for use. Apply the solution to the gold letters with a soft sponge, rub lightly, repeat the operation until successful, mop up, wring out sponge in clean water and go over the letters with alcohol, the denatured quality will do. If, after this has been done carefully, the tarnish or stains are still obstinate, apply a solution of one-half ounce of cyanide of potassium in one pint of distilled or rain water. Let the solution dry on the gold and brush off with prepared chalk. As cyanide of potassium is a deadly poison, great caution must be observed as to its use and the location where it is kept.

—1133—

Removing Spots from Varnished Surfaces.

In order to remove white spots or blooming from furniture and other varnished work, caused by placing dishes containing hot liquids thereon, take a damp cloth, rubbing it first on brown soap and then rub the spot, or use a cloth dipped in kerosene oil, when the spots will disappear. Then immediately clean with turpentine and revarnish.— *J. L. W., Clinton, La.*

—1134—

Removing Spots of Oil Color or Varnish from Stone.

Make a paste from chloride of lime, sal soda and water the consistency of soft putty and apply to the spots to the thickness of one-quarter inch. Allow this paste to remain a few days, then remove it and wipe the spots with water. If the spots have not disappeared try again in the same manner. Rinse well. A more rapid remover may be formed by making a paste of carbonate of magnesia and ether, or still better, a paste made from calcined magnesia and tetrachloride of carbon. Should any one of these methods do the work partially only by resolving the hardened paint, a treatment with soft soap, soda solution or liquid ammonia will no doubt do the rest. Acids must not be used, no matter how dilute, because limestone will not resist them.

—1135—

Removing Ink Blots from White Paper.

Mix one ounce chloride of lime, well pulverized, with two ounces of soft water. Shake occasionally when mixing. Let stand for 24 hours to let the chloride of lime dissolve, then strain through cotton cloth and add 10 to 15 drops of commercial acetic acid to every teaspoonful of the solution. To erase the blot of ink, dip the end of a penholder into the fluid and apply it to the blot without rubbing. Lay a clean white blotter on the blot to absorb the excess of fluid, and if the ink has not disappeared repeat the operation until the spot has become colorless.

—1136—

Cleaning the Floor of a Paint Mixing Shop.

The cheapest method for cleaning paint that has hardened on a floor is to use a solution of caustic soda (four pounds in one gallon of hot water). As this is rather liquid and will only dissolve the top layer of paint it is best to clean the floor a section at a time in the following manner:—Place a border of sawdust, say one inch thick and a few inches wide, around the section to be cleaned and fill the space with the solution one-quarter of an inch deep, letting it remain over night, when the hard paint will have softened and may be removed with a scraper. Or you can take one-half pound each of starch and china clay, mixing them in one gallon hot water, beating it well, and, when cold, add to the caustic soda

solution, which will produce a stout paste that can be applied in a heavy layer to the floor, when it will also soften the paint or varnish and can be scraped or washed off with warm water.

—1137—

Cleaning Linoleum and Restoring Its Life.

Never use soap and water for cleaning linoleum floor cloth. Clear water alone has not so bad an effect upon it, but it is best to mix equal parts of raw linseed oil and turpentine and apply it to the linoleum at night and remove the excess with a cloth next morning. A good means to restore the life of linoleum is to apply ordinary floor wax in liquid form, which will make it look like new.

—1138—

Removing Umber Stains from Linoleum.

In the absence of the information as to the nature of the umber stains, i. e., whether it is oil or spirit stain, we will assume that it is oil or varnish stain, and acid is not required to remove either these or spirit stain. In fact, any acid will not only burn through the stain, but also destroy the color of the linoleum. The best means to remove the stains in question without injury to the linoleum or affecting its color is to use one of the paint and varnish removers you find named in advertising columns of *The Painters Magazine*. By dipping a fitch of suitable size into the remover and daubing the spots the stain will resolve in a very few minutes, which will be noted by its wrinkling, when it can be wiped off with a cloth dampened with benzine or turpentine. However, the remover must not be permitted to remain any longer than is required to soften and lift the stain, otherwise it is liable to take up some of the color of the linoleum. If it is inconvenient for you to obtain such a remover or if the job is too small to warrant you to purchase that material you can go to the nearest drug store and have the druggist make a mixture for you of chloroform and a small portion of spirit ammonia, which will remove any dried spots of stain without injury to the surface.

—1139—

Cleaning and Polishing Window Glass.

A paste for window glass cleaning can be made by mixing one part by weight of olive oil, one part liquid ammonia, two parts air slaked lime, finely sifted, and one part water to a stiff batter, which may be kept in tin boxes or glass jars. When using, rub some of this paste on a soft cloth, apply to the glass, let it dry or at least set; then wipe off with a moistened cloth and polish with a dry soft cloth or tissue paper. In cold or frosty weather, rub a cloth, moistened with alcohol over the glass before polishing. If window glass is washed with weak black tea, to which has been added a little alcohol, it may be polished with dry pulverized chalk or whiting, that is entirely free from grit. For cleaning the dust that hardens in the corners of a sash, use a narrow-bladed wooden knife, that is sharply pointed. Calcined magnesia also makes a good medium for cleaning glass, when moistened with benzine or gasoline. Keep in a well stoppered bottle and apply with a soft cloth.

The best method, however, that we know of for cleaning window glass is in practice in a certain railway terminal, where the car windows are cleaned with finest pumice flour, mixed up in denatured alcohol. The mixture is applied with a soft sponge, deftly rubbed over the glass, then wiped off with sponge and water. After this the glass is mopped with soft white cotton cloth and finally rubbed off and polished with perfectly clean cloth of similar material. The luster given to the glass by this method depends much on the skill of the operator, who must not be afraid to use elbow grease.

—1140—

Best Method for Cleaning Stonework.

Builders' acid, which is equal parts of muriatic acid and water, will remove spots of mortar on brick or stone work, but is not the right material for cleaning stone that is begrimed from smoke and dirt. To accomplish this, apply to the surface, with a long-handled fiber brush, a strong solution of caustic soda or pearl ash. Let it remain on for about fifteen minutes, then wash several times with clear water, using a stiff brush or broom for the purpose. If this will not be effective enough, scrub the stone with a stiff fiber brush, using soft soap and concentrated lye and sand, allowing this to remain on the stone until nearly dry, then rinse with clear water, using a brush to remove the cleansing material. Protect your hands with rubber gloves.

—1141—

Cleaning the Paint on Kitchen Walls and Ceilings.

A great deal depends upon the paint that the walls are coated with. Flat paint or eggshell gloss finish is necessary on ceilings, as no one would care to have a high gloss effect there. But the principal collection of grease and dirt in a kitchen is on the walls, and if the finish is a flat one it becomes impossible to remove it without the use of soap and water, strongly alkaline and scrubbing brushes. It is next to impossible to produce a flat wall finish that will stand such treatment, and unless the wall paint is composed of sufficient oil and gum binder to give a moderately high finish, the walls will always appear streaked after washing. In the case of gloss finished walls, the paint will not only stand more frequent cleansing, but it is also unnecessary to resort to such powerful cleaning mediums as strong soap or ammonia, which act as paint removers. To avoid streaks after cleaning a painted surface the best method is to have a tray on which is placed some pulverized chalk or finest bolted whiting; also to have ready some clean warm water and a piece of flannel, which soak in the water and then squeeze almost dry. Now dip the moist flannel into the dry chalk or whiting, taking up as much as will adhere to it, applying it over part of the painted surface, when a little rubbing will remove dirt and grease. When one side of a wall has been thus gone over, wash it well with clear water, using a soft sponge and rub it dry immediately with a soft chamois. There will be no streaks when cleaned in this manner.

—1142—

Renovating Leather Covered Chair Seats.

Use a colored spirit varnish, that will dry fairly quick and give the right finish, which must not be too glossy. Dissolve 6 ounces pale orange shellac, 2 ounces Venice turpentine, 1 ounce gum sandarac in 40 ounces alcohol and add 2 ounces spirits of turpentine. In a small portion of the alcohol, dissolve $\frac{1}{2}$ ounce brilliant green, spirit soluble, with which color your shellac solution. If the green is too light, dissolve a little Nigrosine B (aniline black). Use 188 degrees denatured alcohol, which is lower in price, than wood alcohol and certainly much lower than 95 per cent. grain alcohol.

Another method would be to give the covers a thin coat of green in japan, extra dark coach green would probably be best. Thin the green with turpentine and to one pint of the mixed color add two tablespoonfuls of coach finishing varnish for elasticity. When this coating is dry and hard, finish with a good elastic flatting varnish, to which you could add enough of the green color to take away the yellow cast of the varnish. High gloss is not desirable on chair seats.

—1143—

Simple Method of Cleaning Wall Paper.

The simplest method is to dust the paper thoroughly with a clean fairly stiff brush, then make a bag of coarse white flannel in which tie or sew up two quarts of wheat bran, and rub this briskly over the paper, always in one direction, taking care not to miss a single spot. If the paper is much soiled you might moisten the bran with oil of sassafras, taking care not to overdo it.

Very stale bread, preferably rye bread, cut up in thick slices, will also clean soiled wall paper by rubbing it over a space of a square yard at a time, taking a new slice as soon as one becomes dirty. Care must be taken to leave no marks or streaks.

Referring to the use of sassafras oil for use in cleaning, about the only reason we can see for it in a wall paper cleaner is to give an agreeable smell and to act as a preventive of souring. The dough preparations that have been put on the market have a tendency to sour after being kept a comparatively short time. For small surfaces the best thing to use is underbaked home made bread. Cut the crust from the loaf and, pressing it lightly against the wall paper, draw it downward with an even motion. As soon as one surface becomes soiled, bring another surface into play. Rye bread, being more doughy in consistency when underbaked, will absorb the dirt from the wall more readily. A more economical method that is very satisfactory is to take a soft cotton towel and pass it two or three times above an open pail of boiling water, so that it will absorb the steam but not become noticeably damp. The towel is then rolled up, and holding it in both hands it is drawn slowly down the wall, taking care to move in one direction only and not to go over the same surface twice. As soon as one towel becomes soiled take a clean one. Soft coal smoke cannot be cleaned from wall paper satisfactorily.

—1144—

Cleaning Terra Cotta Discolored by Smoke.

What to use for washing terra cotta that is stained by smoke.

To one gallon of soft soap add two pounds pulverized pumice stone and one pint ordinary household ammonia, beating the mixture to a soft batter. After dusting the surface apply the mixture with a soft fiber brush or whitewash brush, allowing it to remain for fifteen or twenty minutes on the work, then rub briskly with a good scrubbing brush. Have a large sponge and several pails of lukewarm water ready and rinse down the surface or use a hose for applying the rinse water. The treatment will be efficient in the most stubborn cases.

—1145—

Cleaning Pressed Bricks Stained by Smoke.

The walls had been blackened by coal smoke, which settles on the coping and washes down over the light color hydraulic pressed brick. Dilute muriatic acid, pearline and other substances were tried, none of which would do the work.

Muriatic acid will not remove smoke stains, nor will soda or soda ash do it. Smoke stains must be removed by scrubbing and rubbing with the proper mediums. Try the following method:—Mix one gallon soft soap, two pounds powdered pumice and one pint of liquid ammonia, beating the mixture well. After carefully dusting the brickwork, apply the mixture, that should be in the form of a soft paste, in a fairly thick layer with a fiber brush, allowing it to remain for about twenty minutes; then rub it in on the bricks with a good, stiff scrubbing brush, using plenty of elbow grease. Use a large sponge and plenty of lukewarm water to remove the lather, and then rinse with clear water, or, if convenient, use a hose for rinsing. This, if properly done, will remove the most stubborn case of discoloration by smoke from brick or stone.

—1146—

Cleaning Terra Cotta.

The simplest way to accomplish this is to mix two pounds of powdered pumice and one pint of liquid ammonia with one gallon of soft soap, applying the mixture to the surface to be cleaned with a fiber wall brush, allowing it to remain about thirty minutes. Then rub briskly with a good scrubbing brush. When on trial it shows that the compound has done its work, clean it off with lukewarm water by using a large sponge and rinse, if possible, with a hose, otherwise with the sponge and a liberal supply of clear water. If, after drying, the terra cotta appears dull, it may be revived by rubbing it over with a cloth saturated with kerosene oil, which will give it some what of a "sheen."

—1147—

Cleaning Sandstone or Limestone Fronts.

If the surface is stained with dirt and soot clean this off by applying a strong solution of caustic soda or soda ash with long handle fiber brushes, letting this remain about fifteen or twenty minutes, then rinse with clear water, using a hose when possible, otherwise a large sponge. If the front is water stained use rubbing brick, pumice stone or sandstone of fine grain with water in which oxalic acid has been dissolved. One pound of oxalic acid to one pail of soft water is sufficient. After doing this sponge off with clear water.

—1148—

Cleaning Paint Pots and Overalls.

Soak the overalls first in clear water, then steep them in a solution of caustic soda until the paint becomes softened. This done, wash with soap and water by means of a scrub brush and rinse out of clear water, allowing to dry. The caustic soda should be of 77-degree strength and one pound should be dissolved in one gallon of water. This solution is also effective for cleaning paint pots when they are immersed in it over night.

—1149—

Cleaning a Red Pressed Brick Wall.

Mix with one-half gallon soft soap two pounds powdered pumice and one-half pint 18-degree ammonia; stir thoroughly together and apply to the stained brick. Let it remain on the surface about thirty minutes, then rub briskly with an ordinary scrubbing brush and wash off with clean water, using large sponge. If the stain is due to iron rust, dissolve two ounces of oxalic acid in a quart of hot water, add one ounce of butter of antimony and enough flour to make a paste, which apply with a brush like paint. Let remain two or three days and then wash off.

—1150—

Cleaning Grease from Vehicle Gears.

We know of no mechanical apparatus for cleaning the grease from gears. Elbow grease intelligently applied in connection with the use of one-third crude oil and two-thirds turpentine, or, if the insurance regulations permit, benzine, will be found the most efficient combination for cleaning gears and chassis preparatory to painting and varnishing. Putty knives, steel scrapers, mowing machine knives, common case knives, are all useful in removing the accumulations from these parts of the carriage or car. Coarse burlap, or bagging fabric, cut into strips are also useful in the work.

M. C. Hillick.

—1151—

Removing Discoloration from Brick Chimney.

If the bricks are simply stained or discolored by the soot and occasional smoke from the fire, the following treatment will remove the discoloration:—Mix with one gallon good soft soap two or three pounds powdered pumice and one pound liquid ammonia, and have it the consistency of a semi-paste, or at least a good stout paint. Apply this mixture to the brick surface with a fibre brush; let it remain for twenty to thirty minutes, then rub the surface briskly with a good scrubbing brush. Use lukewarm water and a large sponge to remove the lather made by the mixture, and if not clean enough repeat the operation, applying more of the mixture and letting it remain longer before beginning to scrub. When clean remove all the lather carefully with clear water. If necessary to stain the bricks mix dry Venetian red and French yellow ochre in water to a thick paste, and when you have obtained the color you wish dilute it with a solution of glue made as follows:—Soak one-quarter pound of good animal glue or gelatine in water overnight, then melt in a water bath with more water until finally you have two gallons of glue size, to which add one-half ounce of bichromate of potash, also dissolved in some hot water. Strain the stain through a wire sieve of fine mesh before using and apply with a brush of suitable size.

—1152—

Removing Aniline Water Stain from Colored Rug.

Try a weak solution of tartaric acid (salts of tartar) in water with a sponge, but do not rub. When the stain yields, which you can tell by wringing out the sponge in clear water, then use lukewarm clear water to remove any trace of acid, and allow the spot to dry. If this method does not remove the stain lay white blotters saturated with alcohol over it and repeat this until the stain disappears.

—1153—

Cleaning Gold Leaf on Signs.

When gold leaf on exposed signs is tarnished there is no way to bring back its luster, because it may be due to the leaf not being pure in the first place, in which case the alloy is affected by noxious gases. If the gold letters or ornaments on signs, however, are laid with pure gold leaf and are merely covered with soot or dirt, etc., a sponge moistened with alcohol or with spirits of turpentine will remove the dirt or dust, soot, etc., but the gilt must not be wiped dry. Allow it to dry of its own accord.

—1154—

Killing Oil or Grease Spots on Floors and Plaster.

Grease spots on the floor may be eliminated by mixing chloride of lime with water to a thin paste. Put it over the spots in a layer about one-fourth inch thick, and let it dry, then scrape it off and wash with clear water. If not successful at first repeat the operation. Put the paste only over the grease spot, but do not let it spread further on floor. There is no remedy for the trouble in the plaster or any means to hold back grease spots excepting the use of tinfoil before attaching the wall paper. Even here you have to be careful that the sheet of tinfoil is not broken. If you cannot obtain tinfoil you can try a piece of white table oilcloth, placing the painted side next to the wall, fastening it with tacks and then paper over that, using heavy paste.

—1155—

Cleaning an Old Canvas Tent.

If the canvas has not been sized or painted originally and has not been mildewed, but simply become dirty or unsightly by age, scrub it first with a stiff brush to remove all dust, then apply soft soap and rub briskly with a fibre brush of suitable size and if the dirt is stubborn add a little ammonia to the soft soap. When so cleaned use plenty of clear water to remove the soap and let the canvas dry. If there are any signs of mildew, dissolve bleaching powder in equal parts of water and vinegar and wash the canvas with this solution, using a large brush, as for cleaning with soft soap, and rinse carefully with clear water to remove all traces of bleaching powder. Be careful in the use of the bleaching powder solution, as it is liable to produce sore throat when inhaled. To make the canvas look fresh after cleaning, apply after it has thoroughly dried a size made by dissolving one ounce of yellow soap in one quart of water by boiling, adding to this, while hot, one quart boiled linseed oil and when this has cooled, stir in one-half pint of gold size, applying this to the right side of the canvas. If desired, a small portion of any suitable color ground in oil may be added to produce the effect desired.

—1156—

Cleaning Articles of Brass Covered with Verdigris.

Coat the metal with dilute muriatic acid lightly, then scrub with a fairly stiff brush. Dry with old linen cloth, then polish with soft leather or chamois skin dipped into finest powdered rotten stone. After having obtained a good polish, the sign or other article of brass should be polished frequently with sweet oil and rotten stone to prevent further incrustation.

—1157—

Making Wall Paper Cleaner with Wheat Flour.

A prominent Western painter has given the following recipe, which he claims to be excellent:—Take a shallow two-quart vessel, put in one pint of water and one-half ounce powdered borax. Bring this to a quick boil, so that very little of the water evaporates, and, while boiling, put in the vessel one pound of best wheat flour, stirring all the while, keeping the vessel on the stove. Keep stirring until the flour and water are well mixed and free of lumps, then put the mass onto a clean board and knead it like a baker kneads his dough when making bread. When of the consistency of glazier's putty, the mass is ready for use. If it is sticky, you have too much water or not enough flour, so you had best try it in an out of the way place by using a piece the size of your two hands, and rub on the paper with enough pressure to make the cleaner crumble slightly. If it crumbles too much there is too much borax or not enough water in the mass. When using, work the cleaner in your hands, as you do putty, so as to keep a fresh surface to clean with all the time, and with a little practice you will succeed.

—1158—

To Clean Gilded Articles and Genuine Gold.

To clean genuine gold and have it retain its brilliancy, rub with a soft cloth dipped into alcohol or a watery solution of toilet soap. Should this fail to do the work thoroughly, use a batter made of three parts bruised sal ammoniac and one part burnt lime mixed with a little water. Then finish off with a warm solution of ammonia and water, equal parts, and polish with a dry cloth or chamois skin.

To clean gilded articles from fly specks and other unsightly matter, scrub the gilded portion with a hot solution of soap and water to which a small portion

of ammonia is added, using a soft brush. Rinse several times in rain water, and immediately dry with a soft linen cloth or towel. Then cover the article with fine sawdust until all is dry. Do not use sawdust from wood which is very pitchy or resinous, such as Southern or yellow pine, etc.

The sawdust can be kept for further use if washed out in clean water and dried, because the sawdust absorbs the acid, and when it is washed thoroughly it eliminates all risk of having the gilding appear dull or discolored.

—1159—

Cleaning Brick, Stone and Concrete.

Solution for cleaning brick, stone and concrete surfaces before painting.

It depends very much upon the nature of the stains as to what is the best means to accomplish this. If the stains are caused by water, dissolve one-half pound oxalic acid in an ordinary pailful of water and rub the surface with sandstone of fine grain or lump pumice dipped into the solution. This done, take a large sponge and clean off the surface, then rinse with more clear water. If stained with soot and smoke, in addition to the water stains, clean down with soft soap and water before rubbing, using scrubbing brush and sponge. For cleaning marble or other fine stone fronts the best thing is to use pumice or rubbing stone and water, to which a little ammonia has been added. Soft soap is also best for cleaning cement surfaces, but they must be given a thorough rinsing with clear water and allowed to dry before painting. To remove stains made by smoke on plastered walls use a solution of curd or laundry soap in lukewarm water; scrub spots until they disappear, then sponge with clean water.

—1160—

Cleaning White Plaster Figures or Ornaments.

For figures on ornaments that have not been painted, varnished or lacquered, there is a cheap but effective material. This consists of starch paste, such as is made by housewives for laundry purposes. Apply this starch paste, which must be made fairly stout for consistency to the figures or ornaments to the thickness of one-half of an inch, and be careful to see that all the surface, especially nose, eyes and ears of figures, also any part of ornaments are uniformly covered. Then let the starch coating dry for at least two hours. When it is removed carefully with the fingers the figure will be spotlessly white. Should part of the starch still remain in certain portions of figures or ornaments, let it dry a little while longer, and remove it by going over with a clean, dry brush.

—1161—

To Remove Stains from Granite.

Make a paste of oxgall, say one ounce, and one gill of a strong solution of caustic soda or concentrated lye, adding a tablespoonful of turpentine. Work enough pipe clay (kaolin) into this to make a thick mixture, apply to the stains and scour well with a scrub brush, then clean and rinse with fresh water.

Or make a strong, hot solution of lye by dissolving three pounds of washing soda in one gallon of water and lay it on to the granite with a fiber paint brush, as a good bristle brush would be ruined by the soda. Scrub the stains and rinse with clear water.

—1162—

Cleaning Glass, Spotted by Splashing Paint.

Take first a sharp-edged putty knife that has no nicks in the edge, dip it in turps and cut the paint off as low as possible without scratching the glass. Rub

with a mixture of oil, turps and pulverized pumice stone, then clean off with a rag and soap suds. Wash and polish with a cotton rag, and finally with tissue paper.

—1163—

To Clean Rust from Marble.

To simply clean marble from collection of dirt and soot first remove the dust and soot by dry brushing or brooming, then mix calcined soda one part, pumice stone, one part, in one part water to form a batter of proper consistency to lay on with a brush. Apply this to the stains fairly thick and when dry remove it with spatula and, if required, repeat the operation, then finally clean off and polish by friction with a soft cloth. This also applies to limestone, as marble and limestone are very similar in composition, being almost pure carbonate of lime. After removing stains from and cleaning marble it may be waxed and the surface will then assume a fine polish that will not spot for a long number of years under outside exposure.

—1164—

To Clean Hands from Paint Without Injury to the Skin.

Rub your hands with linseed oil first and then a little painters' naphtha (benzine). Then use good soap and water and a nailbrush to remove the paint from the finger nails. After the hands are well brushed, washed and rinsed, dry on a soft towel or apply the following:—Dissolve three drachms pulverized borax in two tablespoonfuls hot water, add to this one ounce glycerine, one ounce bay rum and a few drops of some perfume, and a few drops of this mixture put on the hands after being cleansed and also before going to bed will keep the hands soft and white.

—1165—

Formula for Home Made Wall Paper Cleaner.

Mix together one pound each rye flour and wheat flour into a stiff dough with water and bake it somewhat, then remove the crust. Then add by kneading one ounce table salt, one-half ounce of powdered naphthaline, one ounce of cornmeal and one-eighth of an ounce of finely powdered burnt umber. Form the mass as much as your hand will hold, and when using it always draw it over the paper in one direction, but only over the paper you wish to clean. A still more simple method is to tie up two quarts of wheat bran in a coarse flannel bag, rubbing it over the paper briskly, all in one direction without missing a single spot. However, in using either the dough or bran, first dust the surface.

In view of the desire for wheat conservation which existed during the war, it was thought well to add the following:—

The next best means to clean paper is to take very stale bread, which is nearly moldy, really unfit for eating, cut it in slices, remove the crust and wipe the paper with the slices in the lightest possible manner in downward direction, doing no more than a yard at a time. Greasy blotches may be taken out of wall paper by mixing powdered pipe clay with water to the consistency of cream, brush the mixture over the greasy spot and let it dry, then brush off the dry powder. There seems to be no way or means for cleaning wall paper by omitting flour or bran entirely.

—1166—

Cleaning Painted and Decorated Church Walls.

How to clean painted and decorated inside church walls that are very dirty, especially above the radiators.

If the walls are coated with oil paint, in flat or gloss finish, the surface should first be thoroughly dusted, then have ready some finely pulverized whiting

as free from grit as possible on a large plate, also some clean warm water and a good sized piece of flannel, which soak in the warm water and wring out till almost dry, take up as much of the whiting as will adhere to the moist flannel and apply it by rubbing to the painted surface, when dirt or grease will be removed almost instantly. Then wash the rubbed part with clean water, using a good sponge and dry with soft chamois leather. Go over the whole surface in this manner, doing as much at a time as you can reach. It is best for two men to work at this, one to apply the whiting by rubbing, the other to do the sponging and drying off. This method is better by far than the cleaning with soap-suds and ammonia water, as it does not injure the most delicate colors, and the surface will look like new. If the surface above the radiators is merely soiled by the radiator coils taking up more dirt by being close to the walls and not darkened from the effect of the heat, an extra good rubbing will clean this part of the walls also.

—1167—

Removing Ink Spots from Light Oak Desks and Tables.

A formula for removing ink spots from light oak office desks and table tops, where varnish is in bad condition. A large portion of the desks is veneered work and the ink has penetrated too deep to be removed by scraping.

This is a difficult task, but no matter what medium you would employ to efface the ink spots, you must first remove any varnish still remaining on the desks or table tops.

The usual method to take ink stains out of wood is to mix chloride of lime with water and let the mixture remain on the spots until the ink is drawn out, when the chloride of lime is removed by several washings with clear water. Oxalic acid crystals moistened with a little water and rubbed over the spots also removes ink, but has a bleaching action on the wood. A journal of pharmacy recommends the application of pyrophosphate of soda, which yields colorless compounds with the ferric oxide of the ink and does not injure the fibre of the wood. A strong solution of the pyrophosphate of soda in warm water is rubbed over the spots until they disappear. A solution of hydrochloric acid in hot water, eight parts water to one part acid, is also recommended. If not strong enough, add more acid; apply with a fiber brush. When stain has disappeared, wash over with hot water to remove all traces of the acid.

—1168—

Cleaning Spots Made by Acid Stain on Sandstone.

This is difficult, because sandstone is very porous and naturally the stain has penetrated rather deep. The best method we know of is for you to procure from a beef butcher fresh oxgall, and mix one part by weight of same with one part by weight each of powdered soap and pulverized pipe clay (kaolin), making a thick paste with spirits of turpentine, which lay on thickly over the stained portion, allow to dry, then scrape it off and wash with warm water. If this does not take out all the stain, make a second application, again washing with hot water. Do not use prepared oxgall, as it has not sufficient strength.

—1169—

Cleaning Brick Walls Showing Efflorescence.

The outside brick walls of a library are to be painted. The bricks are hard pressed and most of them turned white as if mouldy or something of that nature. How can they be cleaned?

The turning white of red bricks is an old evil, for which no effective remedy has as yet been found. The nearest explanation that has yet been forwarded by scientists is that the coal with which the bricks were burnt contained sulphur,

which in time comes to the surface in the form of white powder, especially after driving rainstorms, or when in winter time sleet forms on the surface, which in thawing out forces water into the bricks, thus dissolving the sulphur and permitting the efflorescence to remain for a long time until the walls are thoroughly dry.

The only remedy we have ever known to work a solution of the difficulty is to paint the walls after a long dry spell, when the surface is first brushed down thoroughly with wire brooms or stiff brushes. Then a first coat of oil paint must be given, well rubbed into the surface and permitted to dry hard, the paint not very stout, followed by a second coat of paint with a medium of equal parts raw linseed oil and turpentine and a strong portion of strong drier, so as to dry nearly dead flat; or an eggshell gloss at most. The third or finishing coat to be a full gloss coat, unless an imitation of pressed brick is desired, in which case the second coat should have a higher gloss than is obtained with equal parts raw oil and turpentine. This treatment will hold back the efflorescence.

—1170—

Cleaning Gold Bronze Paint from Piano Finish.

C. M. B., Illinois, asks how gold bronze paint may be removed from a mahogany finished piano without injury to the finish.

This is a difficult matter so long as it is not known what the liquid in the bronze paint was composed of and also the nature of the finish of the piano. If the latter is of the type employed in piano finishing practiced for the last ten or fifteen years, and the bronzing liquid has been of a resinous character, a careful manipulation with carbon disulphide should remove the bronze paint without visibly affecting the finish. But carbon disulphide being very inflammable, great care must be taken in its use, as even close proximity of a lighted cigar will cause it or its vapors to flame. It is also possible that a light rubbing with a soft cloth saturated with amylacetate or a mixture of acetone, two parts, and benzol, one part, will remove the gold bronze, if neatly done, without affecting the finish of the piano.

—1171—

Cleaning Sandstone or Limestone Fronts.

R. G. B., Georgia, wants to know how sandstone or limestone fronts are cleaned.

If the surface is stained with dirt and soot clean this off by applying a strong solution of caustic soda or soda ash with long handle fiber brushes, letting this remain about fifteen or twenty minutes, then rinse with clear water, using a hose when possible, otherwise a large sponge. If the front is water stained use rubbing brick, pumice stone or sandstone of fine grain with water in which oxalic acid has been dissolved. One pound of oxalic acid to one pail of soft water is sufficient. After doing this sponge off with clear water.

POLISHES AND POLISHING.

—1172—

Good Furniture Polish for Household Use.

Take one-quarter pound beeswax, one-eighth pound japan wax, one-quarter pound white castile soap; shred all of these fine, dissolve in one-half gallon boiling water. When all is dissolved, let it cool, then add one quart of turpentine and one quart spirits of wine, and mix well. To be rubbed on to the furniture with a piece of soft cloth and polish with another piece of cloth. This makes an excellent polish that does not remain sticky and cleans and polishes at the same time.

—1173—

Piano and Furniture Polish.

As a polish reviver for pianos and varnished furniture, the best medium we know of is prepared as follows:—To one pint of raw linseed oil add two ounces spirits of camphor; four ounces of vinegar, butter of antimony (antimony trichloride) one ounce and spirits of hartshorn one-half ounce. Keep in stoppered bottle and shake well before using. Apply with a soft cloth and polish with soft flannel or silk.

Butter of antimony, or antimony trichloride, mentioned in the above formula, which has the chemical formula SbCl_3 , is obtained by the action of chloride on antimony, or by heating the trisulphide with mercuric chloride. It is diluted with alcohol, as water would tend to precipitate it.

To polish furniture, that is badly marred, the following is highly recommended:—

Two pounds raw linseed oil, one-half pound grain alcohol, one-half pound vinegar, two ounces butter of antimony and one-half pound spirits of turpentine. Mix in a bottle and shake well before using. Apply with a woolen rubber. This will serve for pianos, and fine cabinet work, as well as for ordinary furniture.

The best method of polishing a piano is to use rotten stone and water, applying in the rotary motion with the palm of the hand, and after wiping clean with a silken cloth, go over the surface with olive oil, also using a piece of soft silk to remove surplus.

French Furniture Polish—Raw linseed oil, one pint; grain alcohol, two ounces; butter of antimony, four ounces. Mix and shake well and apply with woolen rubber.

—1174—

How the So-Called Derby Cream Is Made.

Derby cream is prepared by agitating well in a suitable vessel twelve ounces raw linseed oil and six ounces acetic acid of commercial quality and strength. When a thorough emulsion has formed, add one ounce butter of antimony (antimony trichloride) and six ounces alcohol. A cheap yet good furniture polish which will also serve for floors and is applied after diluting with water with a paint brush and when set polished off with a hard brush or cloth, is prepared as follows:—Boil together one gallon soft water, rain water is best, four ounces sliced yellow soap and one pound yellow country bees' wax, pure, in shavings. While boiling, add two ounces pearl ash.

A white polish for light woods is made by dissolving in one quart of alcohol six ounces bleached shellac, two ounces white gum benzoin and one gum sandarac.

—1175—

e

Quick Surfacers and Polish for Furniture.

A firm of furniture dealers wrote as follows:—In storing tables it is found necessary, in order to economize space, to place one on top of another, and when

so placed we find that under the legs of the upper table the tops of the lower table show sweat spots. What will take these out? We enclose sample of a powder which, when dissolved in wood alcohol and mixed with oil, produces a quick surface finish, claimed to be equal to a rub and polish finish. What does the powder consist of?

The powder is brown shellac of the cheapest grade, which may be dissolved in wood alcohol in a water bath and while still warm pure raw linseed oil is added to it. The mixture is applied to the spots with a piece of soft cloth that does not lose fiber and is gently rubbed. In less than ten minutes it is dry and hard, showing up with good luster. It is best to experiment with small quantities, but we think that two pounds of the pulverized brown gum shellac, three quarts of A No. 1 wood alcohol and one gill ($\frac{1}{4}$ pint) pure raw linseed oil will make one gallon of the material. If one-half pint of raw linseed oil is used, it will not dry as quickly, but will make an excellent renovator for old furniture.

—1176—

Acid Polish for Furniture Work.

Request was made for a formula for the preparation of an acid polish, such as is used in furniture factories. The wood is rubbed with pumice and water in the usual way, and the acid polish, applied by rubbing the resulting finish, is totally unlike that which is produced by polishing with rottenstone and sweet oil, it being harder, clearer, with much more luster.

Try one of the following mixtures, but be certain that the proportions are right:—

1. For delicate cabinet work, mix in a glass bottle thirty-two ounces by weight of raw linseed oil, eight ounces strong alcohol (spirits of wine), eight ounces of strong vinegar (or acetic acid), two ounces butter of antimony and eight ounces oil of turpentine. Shake the bottle well before using the polish and apply with a woolen rubber, using friction.

2. Mix two gallons (fifteen and one-half pounds avoirdupois) raw linseed oil, one and one-half gallons (ten and one-half pounds avoirdupois) spirits of turpentine, quarter pound avoirdupois rosin, quarter pound avoirdupois alum, two ounces avoirdupois iodide of potassium, quarter pound dragon's blood, half pound sulphuric acid (oil of vitriol), and eight fluid ounces nitric acid in an earthen vessel in the following manner:—

First put in the oil and turpentine, then powder the rosin, alum, iodide of potassium and the dragon's blood as fine as possible, and stir it into the oil and turpentine slowly, then add very slowly, under continued stirring, the sulphuric acid. Let it stand ten hours or more, then add the nitric acid, while stirring. Let it stand awhile, then put into a demijohn provided with glass or rubber stopper. Apply with a sponge or cloth.

—1177—

Piano and Furniture Polish.

A very effective and simply made renovating polish is produced by melting in a water-encased vessel (such as a glue pot) half an ounce of white wax, half an ounce of rosin, and one-fourth drachm Venice turpentine, stirring until the whole is melted; then pour out the melted mass and pour on it, while hot, five quarts of rectified oil of turpentine. Let it stand for two hours to form a soft unctuous mass of the consistency of butter. Before applying the renovator, the surface to be renovated should be cleared by sponging it with soap and water, and drying with a soft towel and chamois leather, then rub in the polish with a piece of soft flannel or linen rag, and bring up a polish by rubbing with a dry cloth.

No. 2. Digest together, at a gentle heat, three ounces of oil of turpentine and four ounces of white wax in an earthenware vessel, cover the vessel closely with a piece of strong paper to prevent the escape of turpentine vapor, and

gently warm the mixture until the wax is dissolved; then allow the mixture to cool, until it begins to solidify and assumes a white color; then add two ounces of strong spirits of wine and mix well.

These wax polishes are very much better to use on highly polished surfaces, such as pianos, than sticky varnishes, lacquers or French polishes, because the latter leave a more or less thick film, which in time accumulates and becomes unsightly, entirely obscuring the natural grain of the wood, whereas these wax polishes simply impart a smear to the surface, which is polished off by the rubbing and carries away the dirt, smoke and grease and leaves the original gloss in its natural brilliancy.

No. 3.—Ingredients:

2½ ounces of yellow wax.

1 ounce of white wax.

1 ounce of castile soap.

10 ounces of oil of turpentine.

10 ounces of boiling water.

1 drachm carbonate of potash.

Melt the waxes and turpentine together, separately dissolve the soap and potash salt in the hot water by boiling until the soap is dissolved, and then stir in the wax and turpentine compound while the compound is still hot, and after removing the vessel from the fire continue the stirring until the mass is cold, so as to prevent the wax granulating. This compound forms a furniture "cream."

H. C. Standage.

—1178—

Renovating a Barroom Counter.

To renovate the counter in a barroom that was stained mahogany and is in fairly good shape, was the problem met by a California painter, who wanted to know whether he should take off the old finish or simply touch it up and how?

If the counter is in fair condition, we should advise you to take off the finish with sandpaper and rub to a smooth surface with pumice and water, allowing the work to dry after cleaning up thoroughly. Then go over all of the surface with mahogany stain, wiping it before setting, so as not to show up too dark in worn spots. Give one coat of hard drying rubbing varnish and moss down, then a coat of best finishing varnish, which also moss down when good and hard. Polish with rotten stone and sweet oil.

—1179—

Polish for Papier-Mache Articles.

Mix 2 pounds raw linseed oil, one-half pound spirits of wine, one-half pound white wine vinegar, one-half pound spirits of turpentine and two ounces butter of antimony (antimony trichloride). Shake well before using and apply with a woolen rubber briskly, but without too much pressure, until desired polish is obtained.

—1180—

Liquid Polish for Brass.

The best formula for a brass and metal polish in liquid form was wanted. The inquirer thought the chief ingredients are benzine and whiting, but would like to know if something else must be added to these two to form the material now so generally used.

Whiting and benzine will not produce a polish for brass or other metal. While very fine whiting (chalk) makes a good burnishing material, there are several other minerals far better. Tripoli, emery flour, fuller's earth, rotten stone of good selection, are less liable to scratch the metal and burnish better by far. Benzine is not a good medium for a polish, as it evaporates too rapidly and does

not give the unctuous properties that are required in a good polish. It also lacks the property of attacking the film formed on the metal surface by oxidation.

Here is a very good formula: In a suitable vessel mix 28 parts by weight of fuller's earth of tripoli of finest quality with 12 parts of paraffine oil, 6 parts denatured or wood alcohol, $1\frac{1}{2}$ parts each of camphorated spirits and spirits of turpentine and 1 part of ammonia, all by weight. This, when properly mixed, will produce a soft paste, which you can thin down with benzine and kerosene, equal parts, or with benzine alone to any consistency desired. If you find the cost of this too high to meet your views, you can try either of the following:—

1. Mix 4 parts by weight of rotten stone or tripoli with $1\frac{1}{2}$ parts by weight of cottonseed oil, beat it smooth, then add 1 part by weight of oxalic acid, dissolved in as little water as possible, and enough spirits of turpentine to make a thin paste. Thin with benzine to liquid consistency.

2. Mix one pound soft soap with two pounds of rotten stone to a soft paste and reduce it to liquid consistency with benzine and kerosene, equal parts.

After the above formula was published we received a letter saying:—"I used fuller's earth in making this compound, but it was a very unsatisfactory mixture as to looks. After mixing the fuller's earth and paraffine oil together and adding the other ingredients, the mixture separated and left the fuller's earth dead. Can you advise me how to combine this formula so that it will stay mixed?"

We believe that in the first place your fuller's earth was not fine enough nor was it well combined with the paraffine oil by grinding or mulling. It is also possible that your paraffine oil is not of the proper grade. In order to discover where the trouble comes in we would suggest that you try the formula again in a small way, substituting fine tripoli or rotten stone for the fuller's earth, also test your paraffine oil without any powder by adding the other liquids in order to see whether they will form a mixture. If you cannot obtain the right grade of paraffine oil you can use golden machinery oil in its place.

—1181—

Putz Pomade of Various Compositions.

Genuine putz pomade is said to be composed of:—Oxalic acid 1 part, oxide of iron 25 parts, rotten stone 20 parts, palm oil 60 parts, vaseline or petroleum jelly 4 parts, all by weight. The oxide of iron and rotten stone must be absolutely free from grit. Another recipe is:—Melt 100 lbs. yellow vaseline and stir into it 20 lbs. of fine colcothar, free from grit. Lard may be used in place of vaseline. Still another recipe:—Twenty lbs. mineral oil and 5 lbs. lard are melted together and 25 lbs. fine colcothar, free from grit, is stirred in. In all cases, with any formula, the putz pomade is applied with flannel or woolen rags, rubbed out well and finally polish with woolen cloth.

—1182—

Method of Finishing Furniture in a High Polish.

We assume that you have hardwood furniture in view, and would say that the first step is to see that the work, as it comes from the cabinet makers, is well sandpapered, for if it is not it will have to be done by you in order to have a good surface to begin with. In case the furniture is to be stained, this is the next operation, after which comes the filling with a good paste filler. This dry, sandpaper again, but always with the grain, using 00 or 000 sandpaper, after which dust off carefully and give a coat of shellac varnish, over which apply furniture rubbing varnish, two coats if you can afford it. To make a very good job, three or four coats may be required. When the last coat of rubbing varnish is dry and so hard that the finger nail will not make an impression, rubbing may be begun, but not before.

The rubbing is accomplished by applying rubbing oil (crude petroleum is best), to the surface, sprinkling powdered pumice O or F on the same (if the work is horizontal), and rub with rubbing felt in long strokes with the grain

of the wood. When sufficiently rubbed clean up the oil and pumice quickly, and be very particular about moldings and corners. Fine sawdust that has been dampened will serve very well to take up the oil and pumice, but to make doubly sure the surface should be gone over again with cotton wadding. For a first-class polish apply one coat of cabinet finish and when dry rub down with F. F. or flour of pumice and rubbing oil, clean off very carefully, then, with a piece of chamois skin dipped into rotten stone, rub the surface with a rotary motion. Let the rotten stone dry on the surface, then with the palm of the hand wipe off the rotten stone, keeping the hand in rotary motion, and wipe the hand off on a cloth after each stroke. We cannot recommend any particular brand of varnish for the purpose.

—1183—

Painting and Finishing Enameled Furniture.

The priming is done with keg lead, which is thinned with turpentine and very little bleached oil and white japan. On this are applied two coats of quick-drying flake white, thinned with turps only, the last coat of which is smoothly sandpapered. Now a coat of white enamel is given, this enamel to consist of the finest French zinc in a hard white enamel varnish and allowed to set for three days, when it is rubbed with pumice and water. After twenty-four hours another coat of enamel is applied, which after forty-eight to seventy-two hours is mossed or haired down with flour of pumice and water. If the surface is good and uniform, this is polished with rotten stone and sweet oil; if not, another coat of enamel must be given and proceeded with as before, and finally polished as stated. This will be smooth as a mirror and hard as bone. In surfacing, each coat of lead or flake white must be permitted to dry hard before another is applied.

—1184—

Dressing for Linoleum Cloth, Also Polish for the Same.

A thin solution of beeswax in spirits of turpentine rubbed over linoleum will brighten its appearance.

A dressing for linoleum is made as follows:—Melt over a moderate fire 20 ounces of paraffine wax of the soft variety, add one ounce of palm oil, and when both are well mixed take from the fire to a safe distance and add 4 ounces kerosene. Apply with a rag. The Pharmaceutical Era publishes the following formulas for polish for linoleum:—

1. Melt one ounce of yellow beeswax and two ounces carnauba wax carefully; take from fire and add 10 ounces turpentine and 10 ounces benzine. This is best accomplished in a water bath. Stir until cold, then apply with a rag and polish.

2. Melt 5 ounces yellow beeswax, add 10 ounces turpentine, stirring it well; then add 5 ounces of amber of kauri varnish. Apply with a rag and polish.

—1185—

How Is Wood Polished?

There are various methods for wood polishing; the oldest method known is oil polish, which is very simple. Apply either raw or boiled linseed oil to the wood, but not in a heavier film than the wood can absorb. Take a heavy block of wood and nail a piece of felt to it or wrap the felt around a square piece of stone and rub the surface until no more oil is to be noticed. Let this stand for a few days and repeat the operation every few days until a satisfactory gloss is obtained.

This method, however, is very expensive and requires weeks, even months, to accomplish the desired effect.

French polish, too, is very expensive and we would say that the American method is the quickest and therefore least costly.

After the wood has been filled and varnished, the surface is rubbed with pumice and water to a dead level and then well cleaned to prevent scratches in polishing.

The quickest way to produce the polish is to take a handful of raw cotton and dip it into a mixture of equal parts of refined cottonseed oil and alcohol and rub the job with a rotary motion and a fine luster will appear shortly, and with a little skill on the part of the operator a fine polish is the result.

—1186—

Rubbing with Pumice and Oil or Pumice and Water.

Rubbing with pumice and oil makes polishing more easy than rubbing with pumice and water. But the latter plan is surest, when the operator is working with varnish, whose drying and hardening properties he is not thoroughly acquainted with, or if the operator is a beginner in that line of the trade. If the oil and pumice are allowed to remain on the rubbed surface too long, the varnish is liable to become soft, and a ruined surface is the result. On the other hand, water tends to harden varnish, that may have a slight tendency to tackiness, and the work can be proceeded with more quickly.

—1187—

Finishing Musical Instruments.

The process of polishing violins, guitars, banjos, etc., is of French origin, and is as follows:—First a coat of shellac varnish is given to the wood. When dry it is carefully glass-papered, then a small quantity of alcohol shellac is poured into one dish and a similar quantity of clear linseed oil into another dish. Now a small piece of cotton is rolled up in a piece of soft chamois skin and tied up in the shape of a ball; then apply with a brush the shellac varnish on a small section of the surface, and before the shellac has a chance to dry dip the chamois skin ball into the oil and rub with a firm, steady motion over the section just coated, taking care to have the surface moist with oil, until the polish is obtained. When finishing in sections on the larger instruments take care to cause each section to lay close on to the last one done.

As to piano finishing, that work differs entirely from the French polishing referred to above, and it is much easier to give directions than to do the work successfully, which requires skill and long experience. To simply revarnish and repolish a piano it is necessary to apply two coats of piano rubbing varnish. After the second is applied it should be stood aside to harden for at least a week, then carefully and evenly rubbed with finest flour of pumice and water, and when, in the judgment of the operator, the rubbing is perfect, the surface is to be rinsed with soft or rain water and dried with softest chamois skin. Then a soft cloth (woolen) is dipped into sweet oil and rottenstone and the surface briskly rubbed until gloss is attained, when it should be wiped with soft rags. Now some finely sifted wheat flour is sprinkled on and the whole surface firmly and evenly rubbed with a piece of silk until the highly polished effect is had.

—1188—

Finishing Hardwood Furniture Quickly.

F. R., Jersey City, N. J., asks how hardwood furniture, such as dining-room tables and dressers, can be finished in a hurry, so as not to show marks from hot dishes or the pressure of heavy pitchers.

The only finish we know of that will not show the marks you mention is the old-time oil finish, which, to do properly, takes at least four weeks. It is tedious

work, and if nowadays a man undertakes it, he is not likely to attempt it a second time, unless he gets paid for it extra well. A person should not expect an extra high gloss from a finish of this kind. There is no polished varnished surface, be it French or American polish, that can stand the placing of hot dishes or heavy pitchers without showing marks. The nearest thing to the oil polish that can be done in, say ten days, is to fill the wood with paste filler; apply at least three coats of best alcohol shellac varnish over it, and sandpaper on the last coat of shellac. Then give at least two coats of oil polish, three days apart. Even the hardest and best piano rubbing and polishing varnish will not stand the treatment you refer to, and it is best for you to tell your patron that you will not undertake the job.

—1189—

Polish for Delicate Cabinet and Papier Mache Work.

Mix 16 parts raw linseed oil by weight with 4 parts vinegar, 4 parts alcohol, 1 part butter of antimony (antimony trichloride) and 4 parts spirits of turpentine and keep in a well stoppered bottle. Always shake well before using and apply with a woolen rubber.

Another good formula consists of the following:—Mix one pint of kettle boiled linseed oil with two parts of grain alcohol or denatured alcohol shellac varnish. Shake well before using and apply in small portions only with a cloth and rub until high polish is obtained.

—1190—

The Function of Butter of Antimony in Polish Formulas.

Antimony trichloride or, as it is popularly known, butter of antimony, is introduced into furniture polish primarily as a cleanser, but not entirely for that purpose. While vinegar, ammonia or spirits of hartshorn are more effective in cleansing, butter of antimony will not affect the varnish to such an extent, i. e., is a very good cleanser without in any way affecting, but rather assisting in obtaining, the luster desired. Hence butter of antimony will be found in many formulas containing vinegar or ammonia or camphor spirits.

—1191—

Essential Oil to Disguise Objectionable Odor in Furniture Polish.

The cheapest means of disguising the odor is oil of myrbane, the synthetic oil of bitter almonds. Camphor oil or spirits of camphor is also a very strong medium for the same purpose. Oil of origanum, the synthetic oil of thyme, emits a pleasant flavor, but is most too weak for your purpose, while the synthetic oil of wintergreen, which is very strong, is disliked by many persons on account of its odor. Most all other essential oils are too high in price to use in furniture polish.

—1192—

Wax Finish for Laboratory Table Tops.

In Continental Europe all hardwood floors in the best houses used to be finished with wax, ironed in hot. The painters who did that kind of work used irons, similar to the flat irons used by tailors for pressing cloth. The job mentioned is very similar to that method of waxing floors. Take a lump of yellow beeswax and hold it close enough to the flat iron to melt it on the table top, then pass your iron back and forth over the molten wax until the wood is well filled and presents a smooth, polished surface. But you must not attempt to do a larger space at a time than say about two feet square. Try it first on a piece of wood similar to that of which the table tops are made. The object of speci-

lying to have the tops done in that manner is to make reasonably sure that the wax is well forced into the pores of the wood and so have enough wax there to keep the wood protected from any acid or alkali that might accidentally come in contact with it. To do this in the ordinary way similar to waxing a floor with brushes would not be sufficient protection or else would leave an excess of wax on the surface, which would be undesirable.

—1193—

Butter of Antimony and Oil of Lemon for Polishing.

Genuine oil of lemon is obtained by distillation from the rind of lemon, and is classed as an essential oil. When used by piano polishers it is because of its fragrance in the rooms of fine residences and because of its leaving no grease behind it, but it would be too expensive in the shops, as it is quoted at eighty-five cents per pound, wholesale. Butter of antimony, a salt of the latter (chemically antimony trichloride) is not used by itself, but in polishes with other ingredients, such as linseed oil, alcohol, vinegar and turpentine. For fine cabinet work the butter of antimony is preferable to oil of lemon, while the latter will answer better for a piano polish.

—1194—

Cutting Shellac Gum—Making Furniture Polish and Floor Wax.

To cut gum shellac in a small way have a wide mouthed glass jar of convenient size, with a tight stopper of glass or tightly fitting cork or bung. If you wish to cut white or bleached shellac, buy it in hank form and see that it has not blackened, crush it to a coarse powder and use 3 pounds of same to each gallon of 95 per cent. denatured grain alcohol or 95 per cent. wood alcohol, as you may require. To cheapen it or to make it work more freely under the brush use only $2\frac{1}{2}$ pounds of gum and one-half pound of clear Venice turpentine.

For orange shellac use 4 pounds of the flake and for brown shellac use a similar quantity of button lac to one gallon of either denatured grain or wood alcohol. If instead of glass jars you wish to use a tumbling keg, see that the same is not charred inside, so as to keep the color in the natural. If you cut the shellac in jars keep them in a warm place and stir frequently until all is dissolved, then strain through cheese cloth. If Venice turps are used with the orange or brown shellac, not over 10 per cent. of the weight, the gum must be replaced by the Venice turps.

A good furniture polish for household use is made as follows:—Cut into fine shreds one-half pound beeswax, one-quarter pound japan wax or ceresine wax, one-half pound white castile soap, dissolve in one gallon of boiling water on a water bath. When all is dissolved, take from the water bath, stir until cool, or at most lukewarm, then one-half gallon each of spirits of turpentine and denatured grain alcohol. Mix well and bottle. Rub on the furniture with a soft cloth and polish with another piece of cloth. Cleans and polishes at same time, and does not catch the dust by remaining sticky. A good hard floor wax may be prepared by melting in a water bath, or still better, steam bath, equal parts by weight of ceresine wax and carnauba wax in spirits of turpentine, stirring it often during the operation. The carnauba wax is a vegetable wax, very hard, and takes on a good polish, the ceresine wax is refined mineral wax (ozokerite) mixed with a certain portion of paraffine. When cool, the floor wax should be in soft paste, similar to tallow, and is brushed on the floor with a flat bristle tool and polished with weighted floor brushes. When a floor is marred or scratched it is readily repolished with this kind of wax.

—1195—

Auto Brass Polish, Brass Varnish and Auto Top Dressing.

Formula for auto brass polish, brass varnish and auto top dressing:—

A varnish for polished brass can be had by reducing a hard drying, pale finishing varnish to about one-half its normal consistency with pure turpentine. Apply to the surface with a camel's hair or bear's hair brush, laying on a thin, uniform coat. A special lacquer may also be used.

In preparing the brass for the varnish or lacquer, as the case may be, and before using metal polish it will be necessary to employ a solvent medium to cut off and remove the old lacquer or varnish. And for this work the lacquer thinner, a special liquid furnished as a thinner for the lacquer, will be found a quick and efficient medium for this work, it being naturally a strong solvent.

A substitute for this solvent may, of course, be made by adding to 30 parts sulphuric acid 15 parts pulverized bichromate of potash. To the acid and potash add water in quantity equal in weight of these two ingredients. Apply to the brass with a partly worn soft brush, wash thoroughly with clean water and polish with calcium carbonate brought to a paste condition by mixing with mutton tallow.

Nevertheless, this method, or similar ones, which might be mentioned, are, in the long run, quite as expensive as the bought ready-to-use polish and lacquer solvent, with the chance of their being less satisfactory, and certainly offering more work to prepare them for use.

An auto top dressing for tops other than black may be prepared by adding to one-quarter gallon of elastic body finishing varnish one and one-half ounces of beeswax, the beeswax being cut with fine turpentine. Apply a thin coat of this mixture. For black tops, leather or rubber add sufficient ivory black to color the dressing to the required density. Another material for the latter class of top may be prepared by adding ivory black to neatsfoot oil to the extent of giving the oil a solid black appearance. Apply with soft cloths, and with clean woolen fabrics polish to a dry condition.

For cheap rubber tops on a class of runabouts now being marketed prepare a dressing as follows:—

- $\frac{1}{4}$ gallon liquid asphaltum,
- $\frac{1}{4}$ gallon finishing varnish,
- $\frac{1}{8}$ gallon boiled linseed oil,
- $\frac{1}{8}$ gallon pale coach japan,
- $\frac{1}{2}$ pound coach black.

Thin with turpentine to the right brushing consistency—that is to say, a thin brushing consistency.

—1196—

Blooming of Polish on Furniture.

The cause for the blooming which looks pretty much like the dew on a ripe plum is caused by the oil that sweats out of imperfectly polished surfaces and unites with dust, this bringing about grease spots eventually. The best remedy is to rub the surface with a soft chamois leather moderately moistened with clear water with uniform pressure. If this be done at least once a week, the blooming will be stopped, unless the polish itself has suffered. The best medium for repolishing is a gum shellac solution, made by dissolving in a glass jar one-quarter pound best orange shellac in one quart of alcohol, permitting it to stand a few days, well corked and shaking occasionally. To apply this polish use a soft brush and quickly go over the surface with rubbing felt in a rotary motion, until the polish begins to set.

—1197—

Is Rotten Stone the Best Material for Polishing?

There are numerous pulverized substances that are used in polishing, among them being prepared chalk, infusorial earth, kieselguhr, pumice, brick

dust, pipe clay, tripoli, crocus martis, colcothar, rouge, emery flour, levigated flint and rotten stone. But most of them are used on hard substances or bodies, such as soft metal, bone, wood, etc. We know of nothing superior to bring out a high polish on varnish that has been rubbed than the finest grade of rotten stone, which, of course, refers to the oil varnishes only and not to spirit varnishes or the French method of polishing.

—1198—

Furniture Polishes in Two Grades.

Recipes for furniture polishes of high grade and cheapest grade.

A quick furniture polish, producing a very high luster, and which is not apt to collect dust, is prepared as follows:—13 ounces gum sandarac, 3 ounces W. G. rosin, 1 ounce gum benzoin, all powdered, and 1 ounce gum camphor are dissolved in 95 per cent. alcohol (denatured alcohol will do). Place in a bottle, which keep well corked in a warm place and shake occasionally until all the gums are dissolved, then strain through fine cheese cloth and put into another bottle, adding two ounces sulphuric ether. The quantity of alcohol required is one-half gallon. Apply the polish with a soft rag and polish with linen or woolen cloth, rubbing briskly.

The cheapest furniture polish is cold pressed raw linseed oil, but as you cannot readily obtain this article nowadays, and as linseed oil is high at any rate, we give you as the simplest recipe the following:—Melt 4 parts, by weight, of hard paraffine wax (135 degrees melting point) and one part by weight of pure lard; take from fire and immediately add hot water, as much as it will absorb, and while stirring add drop by drop 12 parts pure spirits of turpentine. When cooling the mass will be in the form of a soft paste. Apply as usual and polish with cloth.

—1199—

Recipes for Good Furniture Polishes.

There is a great variety of furniture polishes and we have only recently, in our issue for November, published two of them. But as you are a new subscriber and probably have no access to that number, we shall here furnish two recipes that may be better adapted for your purposes. For general use about the house the following is excellent:—

Slice fine 4 ounces yellow beeswax, 2 ounces white japan wax and 4 ounces white castile soap and dissolve in 2 quarts of boiling water. If the water does not remain hot enough to dissolve all use a water bath. When all is dissolved let it cool till it is lukewarm, then add, while stirring, one quart spirits of turpentine and one quart alcohol, the denatured quality will serve the purpose and be cheaper than the rectified spirits. See that all is thoroughly mixed. Rub on the furniture with soft cloth and polish with another piece of similar cloth. This polish does not remain sticky and cleans the surface, while it is being polished. For polishing surfaces originally highly polished like fine cabinets and pianos, etc., the following is highly recommended:—Mix in a wide-mouthed glass jar or other convenient glass bottle and cork well 16 ounces of raw linseed oil or poppyseed oil, 8 ounces spirits of wine or denatured alcohol, 8 ounces white wine vinegar, 2 ounces butter of antimony (antimony trichloride), 8 ounces spirits of turpentine. Shake the jar or bottle well before using and apply with woolen rubber or cloth.

—1200—

Wax Polish for Floors at Moderate Cost.

Take 200 parts by weight of pure yellow country beeswax sliced fine and heat same in 800 parts, by weight, of water to the boiling point, then add 25 parts, by weight, of potash that has been dissolved in as little water as possible, boil for

a short time, add 20 parts, by weight, of pure spirits of turpentine and stir until cold. This produces a soft paste, which for the purpose of renewing a wax finish may be thinned still further with one-half its weight of water. This is a partly saponified and partly emulsified mass.

Another recipe is as follows:—200 parts by weight of pure yellow beeswax are heated in 900 parts by weight of water until the wax is melted, then 40 parts of potash previously dissolved in a little water are added. Then the mass is boiled until it foams, when it is taken from the fire and stirred until cooled. On account of the foaming and the risk of boiling over, the operation must be performed in extra large vessels.

—1201—

Wax Emulsions for Polishing Floors.

We are in position to give you several formulas for wax emulsions for waxing floors, but as we have not made or tried them ourselves in a practical way we cannot guarantee results, though they appear to us practical. The most satisfactory one is of the following composition:—Five parts by weight of bleached shellac, 5 parts by weight of gray carnauba wax, 5 parts by weight of japan wax, 15 parts by weight of water, 4 parts by weight of calcined soda. Method of preparation is as follows:—Dissolve the soda in one-half of the given weight of water; bring it to a boil and add the granulated pulverized gum shellac. Boil until the latter has formed an emulsion with the water and soda. Then add the carnauba and japan wax, also balance of water, and boil again until all the mass has formed a uniform emulsion. Lastly add the paraffine wax, boil with constant stirring until the mass is free from lumps and of uniform consistency throughout. Take from fire, but keep stirring until the mass has cooled to about 130 degrees F. and pour into containers. Another formula does not require the use of gum shellac, but instead the japan wax is increased and the parts here given are by weight 5 parts gray carnauba wax, 10 parts japan wax, 15 parts hard paraffine wax, 100 parts water and 4 parts calcined soda. The method of preparation is similar to that of the first formula, the process beginning in this case with the saponifying of the carnauba wax with the aid of the soda. When using this wax emulsion on floors it is applied in a thin layer with a suitable brush or cloth and allowed to stand for two or three hours, then polished as usual with a weighted floor brush. After a few days floors so polished may be wiped with moist cloths. This wax emulsion, if made considerably thinner by the addition of more water, makes an excellent reviver for linoleum.

—1202—

Piano Polish and Paint and Varnish Revivers

Formula for a good piano polish, and a paint and varnish reviver to be used on the exterior of street railway car bodies.

An excellent piano polish is produced by mixing one pint of well settled raw linseed oil and two ounces spirits of camphor, four ounces white vinegar, one ounce butter of antimony (antimony trichloride) and one-half ounce spirits of hartshorn in a bottle and have it well stoppered to keep from evaporating. Before using, shake the bottle well and apply the polish with a soft cloth, then polish with fine silk. Rub until a high polish appears.

A simpler and quicker method for polishing pianos is to mix two parts of white shellac cut in grain alcohol with one part of raw linseed oil. Apply with soft brush or cloth and rub briskly with flannel or silk until high luster is obtained. Do not apply too liberally. As to a paint and varnish reviver we are somewhat skeptical as to a good formula to revive varnish on car body exterior, while we have found an excellent reviver or restorer for oil paint on the exterior of dwellings in a mixture of three parts of old-fashioned kettle-boiled oil and one part of pure gum spirits of turpentine, when applied to the surface after thorough cleansing with water and permitting it to dry. When it comes to varnished surfaces like car bodies you might experiment with a mixture of

say one-half pint of white or bleached shellac varnish that has been cut in 95 per cent. grain alcohol (Cologne Spirit) and one-quarter of one pint of lithographer's varnish, adding sufficient denatured grain alcohol to make the mixture flow freely.

—1203—

Furniture Polish That Will Hide Scratches.

You will not find a formula anywhere for a polish that will fill up the scratches in old varnished surfaces or that will completely hide them. It is against the nature of things. When a varnish film has been scratched the film is abraded, generally clean to the wood, and a polish cannot fill the void. The only remedy is to remove all of the varnish, either by sandpapering, scraping or with a varnish remover, and put a few new coats of varnish on the surface. The nearest the writer has ever been able to do to that which you desire was by making a mixture of orange shellac varnish and raw linseed oil, six parts by measure of the former to one part of the latter, applying over the thoroughly cleansed surface with a fitch tool and letting it dry same as ordinary varnish. The oil is quirked into the shellac varnish by means of a stiff fitch, but must be added a little at a time. Of course, in this method of polishing, rubbing is not required. If the furniture be of dark wood or is to imitate dark wood coloring matter may be introduced which will tend to obscure or hide the scratches to quite an extent. In order to make the polish referred to dry more quickly the oil may be reduced to one-half the quantity given, but in any case the shellac varnish must not be too stout.

—1204—

Best Way to Fill and Finish Oak with a Polish.

First have the wood well sandpapered, cleaning up any soiled places; then thin a good mineral paste wood filler (that made with straight silex in the pigment being best) with pure turpentine to the consistency of medium bodied varnish; apply it with a good brush and rub it well into the grain and pores of the wood. When fairly well set, which is when it begins to show flat, you can rub it into the wood with a pad made by glueing leather on to a block of wood, always rubbing across the grain. For round moldings of balustrades have a long strip of leather to draw back and forth around the work. Fill only as much surface at a time as you can wipe off before it sets too hard to wipe off without rolling up. Wipe off with tow or excelsior shavings all the filler except that which is in the grain or pores, and be careful to have all the grain and pores level full of the filler, because upon that feature the success of your work depends. All rubbing and wiping must be done across the grain. Give the filler all the time to dry you can, but never less than thirty-six hours, especially where the grain is rather open. When dry go over it lightly with No. 0 sandpaper to take off every particle of filler left on the surface. The cleaner you wipe off the filler the cleaner the finished job will be. If you desire your oak stained it is best to have the paste filler colored, and you can obtain it from the manufacturer in the natural, in antique, golden or weather effect, so that you need not stain the wood first. If you want to do high-grade work it is well to examine the filler surface with a magnifying glass to see if the pores are well filled and no pinholes visible. If there are such defects it is best to go over the surface with the filler a second time, but have it of thinner consistency than at first, and repeat the operation of rubbing, wiping off and sandpapering. Now you can apply one or two coats of white shellac, which, when hard, rub down with fine sandpaper; then put on a coat or two of hard oil finish or cabinet rubbing varnish and rub down with curled hair or hair cloth to dull the gloss. The shellac varnish may be omitted, but in that case an extra coat of varnish will be needed. If you want merely a good eggshell gloss rub the last coat with raw oil and flour of pumice and wipe dry with soft cloth. For a good polish rub with flour of pumice and water first, then wipe dry and polish with rotten stone and sweet oil. For high luster apply a coat of cabinet finishing varnish on the rubbed varnish surface and omit rubbing this.

—1205—

Refinishing a Piano with Mahogany Case.

Rub down the cracked surface with steel wool of medium fineness, No. 0 or No. 1, using rubbing oil. Get below the cracks and clean up well, using benzine, but be careful not to let the benzine stay on too long or to let it get inside the piano casing. If the varnish is cracked clean to the wood, you may have to use a little stain before revarnishing. In refinishing the casing use only the very best piano rubbing varnish as a first coat, and after rubbing this down to a good level apply a high-grade piano finishing varnish, at least two coats, and polish the last coat, when thoroughly hard, with sweet oil and rotten stone. For a first-class job, one that will be lasting and not show a repetition of cracking, you had better, after removing the cracked finish, give two coats at least of rubbing varnish, three days apart, rubbing the last coat with pumice and water, and after cleaning up and allowing to dry, proceed with piano finishing as above, one or two coats, as may suit individual ideas best.

—1206—

Formula for an Excellent Furniture Polish.

Recipe for a good furniture polish:—

If wanted for household use, the following makes a very good cleanser and polisher that does not remain sticky. Shred fine four ounces pure country beeswax, two ounces Japan wax, and four ounces castile soap (white), and boil all in one-half gallon water until dissolved. Take from fire, let cool and add to the mass one quart pure spirits of turpentine and one quart 95 per cent. alcohol. Mix thoroughly to make one uniform liquid. For use, rub it on the furniture with a piece of soft cloth and polish with another piece of cloth.

French furniture polish is made by mixing one pint raw linseed oil, two ounces 95 per cent. grain alcohol, and four ounces butter of antimony (antimony trichloride) thoroughly, applying it with a woolen rubber.

Varnish polish for woodwork of excellent quality may be made by placing the following ingredients in a bottle, shaking before using:—One pint boiled linseed oil, one pint turps, three gills vinegar, one-half pint alcohol (denatured), and one-half ounce butter of antimony.

—1207—

Finishing the Top of a Bar and Refinishing an Old One.

To finish a new top, or one that has been redressed by removing the old finish and planing over, there are two methods. One of these is the old style oil polishing, which when finished will not show marks from hot dishes or glasses, nor become white or marred when alcoholic beverages are spilled upon the surface. The best way to work this method, while business is proceeded with, is to have a false top for placing over the bar while each coat of the oil polish is drying. If the top requires staining a good rich oil and pigment stain of the desired color is first applied, and when this has dried hard a coat of kettle-boiled linseed oil of good body is applied with a suitable brush. A piece of heavy felt, say four by six inches, is fastened to a heavy block of hard wood, so that the tacks holding the felt will not scratch the counter top, and with this pressed by both hands in rotary motion the oil is being rubbed into the wood until it becomes too sticky for further action. When the first coat of oil has dried, which will require anywhere from forty-eight to seventy-two hours, another coat of oil is applied and rubbed like the first, and this is kept up until a mirror-like finish is obtained, for which five or six applications may be necessary. When the desired finish is hard the top should be treated to a polish with a good bar oil once every week for a month, and then once a month, which treatment will keep it in good condition indefinitely.

A quicker but not nearly so durable method to finish or refinish a bar top is as follows:—Apply after stain, if such be used, is dry, one coat of orange shellac varnish and when this is hard apply another and another until five or six coats have been given, which can be done in less than two days, then rub with pumice and water until you have a perfectly smooth surface; clean up and polish with rotten stone and oil. This will make a fine finish but will be easily marred by hot cigar ashes, hot dishes and softened by alcoholic liquors. By oiling the top frequently, however, say twice a week at first and later on weekly with a bar oil containing paraffine oil and a trifle of paraffine wax, this finish will hold out fairly well, especially if taken good care of.

—1208—

Good Brass Polish.

There are numerous ways to accomplish this, and the simplest one is to dissolve 3 ounces of oxalic acid in 40 ounces of hot water, adding 100 ounces of flour of pumice, 2 ounces of turpentine, 12 ounces of soft soap and 12 ounces of linseed oil or sweet oil. This, when well mixed, will make a good polishing paste for brass that is applied with a piece of flannel and briskly rubbed. Or take of rotten stone $\frac{1}{2}$ pound, oxalic acid in fine powder 2 ounces, sweet oil 3 ounces. Mix very thoroughly with turpentine to make a paste. When using either of the above moisten the paste with a little water, and to obtain a high polish use friction with a soft leather.

—1209—

Emulsated Wax Polish for Floors.

Formula for a wax polish for keeping waxed floors in good condition by using an emulsated wax, applying same from time to time with a soft brush and then polishing with a weighted floor brush.

This polish can be made by emulsifying pure beeswax, the yellow article known here as yellow country beeswax, in a solution of potash in water. To make it in appreciable quantity, put, say, one quart of water in a suitable kettle with one-half pound of potash and bring to a boil when the potash will be dissolved, then stir into this two and one-half pounds of the wax that has been sliced or shredded, and keep the mass agitated steadily with a clean wooden paddle until no more free water is noticeable. Take kettle from open fire and pour into it a small portion, say one-half pint of boiling water, stirring the mixture thoroughly. If a fat-like mass appears without showing traces of watery substance it proves that it is in condition to receive more hot water without separation. Then put in as much as twelve gallons of boiling water, set back on the fire for ten minutes without bringing it to a boil. Remove again from the fire, but keep stirring until the mass has cooled in order to prevent any separation of water and wax. The mass will now be of the proper consistency for floor polish, but if wanted for ordinary furniture polish to be applied with a cloth and to be polished with flannel as much as twenty gallons of water may be used for the amount of wax and potash indicated. In that case the emulsion will be of the consistency of thin cream.

—1210—

Cloudy Appearance on Highly Polished Varnish Surfaces.

A varnish polish and preservative is made consisting of oil, alcohol, turps and water. This combination is very good, with the exception that it leaves a cloudy appearance on highly polished surfaces, such as limousines, and also shows finger marks too plainly. Advice wanted as to some chemical that could be added to eliminate the cloudy and greasy effects that usually show in polishes having oil as a base, and also a varnish gum that may be best suited and the process required properly to incorporate it into the mixture.

Our formula would make a fairly good polish for delicate cabinet work, but would be still better for such purpose if the water were replaced by vinegar and some butter of antimony (antimony trichloride) added. The proportions should be as follows, by weight:—Sixteen parts well settled linseed oil, eight parts 95 per cent. alcohol (grain or wood, but not denatured), eight parts strong vinegar, two parts butter of antimony, and eight parts pure gum spirits of turpentine. Mix well and always shake before using, apply with woolen rubber. For your work on varnished and highly polished surfaces as a reviver and preservative, we would suggest that you omit the water, using vinegar in its place, and add any one of the following gums:—Pale kauri, selected Pontinak, gum sandarac or gum mastic. Gum mastic, however, is rather high in price and not as good, when used on exposed surfaces, as are the harder gums, such as kauri or Pontinak. Either of these, as well as gum sandarac, will dissolve in 188-degree proof denatured alcohol, when pulverized, and the solution may be hastened by gentle heating in suitable apparatus. Thus you can introduce the gum without the aid of a varnish kettle, and by using a smaller portion of linseed oil and a larger portion of turpentine increase the luster and hardness of the polish. The butter of antimony cannot be used in a composition that contains water, because in this case precipitation would be caused.

—1211—

Various Kinds of Polishes for Metals.

This question is not within the scope of the painters' line exactly, and the subject put up to us is a very extended one that cannot be exhausted in a few lines.

One universal formula or recipe will not do for every kind of metal, and we could mention dozens of them, all more or less efficient in cleaning and polishing certain kinds of metal. We take it, however, that you prefer those which are most readily put together, and the ingredients of which are easiest to procure.

For a liquid polish that will clean brass, copper, German silver and like metals, as well as produce a good polish, mix one quart heavy paraffine oil, one pint wood alcohol, one-half pint spirits of camphor, one-half pint spirits of turpentine, and one-quarter pint liquid ammonia. Pour the ammonia into the oil first, then add the wood alcohol and turpentine and finally the spirits of camphor. Then, while constantly stirring, add infusorial earth in fine powder, say about $3\frac{1}{2}$ pounds. If the polish is to be red, add some very fine red oxide of iron and that much less of the infusorial earth. Tripoli will answer in place of the latter. Apply with a cloth and when dry use another clean cloth to polish.

A polishing powder may be made by mixing 30 parts by weight of infusorial earth or tripoli, 10 parts bolted whiting, 10 parts kaolin or pipe clay, and 1 part tartaric acid (salt of tartar). Powder the tartar and mix well with the other ingredients and color with one-half part of oxide of iron, if a pink cast is desired. Wet up with water and apply with soft cloth. When dry polish with a clean dry cloth or chamois leather.

—1212—

Polishing White Varnish Enameled Work.

Rub varnished surface over with sandpaper after every coat has become dry and hard, or use steel wool for extra fine work. When the surface is well leveled and the last coat dry and very hard rub it down with 00 pumice stone or 00 steel wool, using either water or oil, then follow with rotten stone and water or oil, but clean off well to avoid scratches. For extra fine work mix one pint of shellac varnish with one-half pint linseed oil. Shake well before and while using, apply with woolen cloth and rub briskly until surface is hard and lustrous.

—1213—

French Method of Polishing Wood.

To describe this process requires more space than we can spare in these columns, and the practice has become almost obsolete, being superseded by the American process, which is less costly and less tedious. A lengthy description was published in *The Painters Magazine* for November, 1915.

The process of French polishing simply consists of the gradual filling of a raw or stained piece of wood by an alcoholic solution of shellac in as many coats as are required to bring the surface to a high mirror-like polish by rubbing every coat with a pad made of strips of woolen cloth, rolled up to a certain diameter, the side being enveloped in muslin or cheese cloth, which is folded over the top to serve as a handle. During the operation the pad or rubber is lubricated by small portions of shellac varnish. A few drops of linseed oil are also used from time to time to keep the pad from clogging or sticking. Anywhere from six to eight coats are required, and finally an operation, known as "spiriting off," must be resorted to in order to get rid of the oil used to keep the pad from clogging. It can be readily seen why the process is too slow for Americans, who prefer to use rubbing and finishing varnishes, as they can produce a finish almost, if not quite, equal to the French process.

—1214—

Filling Holes in Hardwood and Polishing Hard Oil Finish.

If the holes are not too large we suggest floor crack filler which usually consists of carnauba wax and ceresine wax in combination, beeswax being too high in price and not hard enough. You can rub and polish true hard oil finish by letting it become thoroughly hard, but do not attempt to rub and polish a cheap grade that is mainly made up from rosin and turpentine substitute.

—1215—

Wax Floor Polish.

Take equal portions by weight, say about three pounds each of ceresine wax and carnauba wax shredded into chips, place same in a suitable kettle, in a water bath or sand bath, or have the kettle on a steam coil and melt the waxes in turpentine, gradually using three gallons of same, stirring the mass frequently until it is uniform and has the consistency of very soft butter; then remove kettle from the heat and pour the contents into containers, such as you wish to keep the wax in for future use. On thorough cooling, the wax should be of the appearance of butter, so that it can be applied with a stiff brush to the floor, and after setting, polished with a weighted floor brush. Beeswax does not give the proper hardness and paraffine wax does not keep well in solution and will crumble on application to the floor.

—1216—

Polish for Gum Wood, Stained and Filled.

The most simple and least troublesome method to make and apply such a polish as you are looking for is to place in a glass bottle of one-half gallon capacity the following:—8 ounces raw linseed oil, 4 ounces denatured alcohol, 4 ounces strong vinegar, 1 ounce of butter of antimony (antimony trichloride) and 4 ounces spirits of turpentine. Shake well and apply the polish with a woolen rubber, rubbing until the desired finish is obtained.

—1217—

Formulas for Furniture Polish.

1. Wood alcohol, two fluid ounces; raw linseed oil, fifteen fluid ounces; spirits of turpentine, fifteen fluid ounces, makes one quart and is mixed cold.
2. Melt one ounce by weight of paraffin wax; take from fire and add one pint each of raw linseed oil and spirits of turpentine.
3. Mix, without heat, eight fluid ounces kerosene oil, three fluid ounces each of spirits of turpentine and raw linseed oil and two fluid ounces of cedar oil.
4. Mix, cold, one fluid ounce acetic acid, one fluid ounce hydrochloric acid, four fluid ounces spirits of turpentine and ten fluid ounces of raw linseed oil.

Directions for use of any of the above:—First, thoroughly clean the furniture from adhering dirt by the use of warm soapsuds. After wiping dry, apply the polish with a woolen or cotton rubber on a brush, so that the surface is well covered, then using soft, dry rags, rubbing briskly and with friction until dry and a high polish is obtained.

—1218—

Polish for Soda Water Counter Tops.

Some years ago, before the Massachusetts Pharmaceutical Association, Wm. C. Durkee read a paper in which he recommended the following for renewing the polish on the soda fountain or counter:—Melt 10 parts, by weight, of beeswax; pour into this 70 parts of turpentine, stir until cold, then add 10 parts pale gold size. Apply this to the dry marble with a soft cloth and rub until a polish appears. The gold size can be omitted if desired, but the polish will not have as high a gloss or be as durable without it. The polish is not injured by wetting with soda water and will wear a considerable time if rubbed over daily with a dry cloth. In place of beeswax, carnauba wax may be used.

—1219—

Restoring Furniture of Fumed Oak Bruised in Transit.

You would not care to go to the trouble of removing the wax finish that is generally used on fumed oak and you cannot use any solution on the wax finish to hide the bruises or scratches. The best plan we can suggest is to remove the wax finish only where the defects and scratches show and make stain by thinning drop black that is free from the addition of blue, with turpentine, brushing this over the scratches or bruises wiping the surplus off with a cloth before the stain has time to set. Some drier should be added if you use the black ground in oil, but it is more convenient to thin drop black in japan. When the stain has dried after rubbing over with the cloth, go over the spots with wax to fill in and finally go over all of the surface with wax furniture polish.

—1220—

Polish for Plate Glass Mirror, Silver and Brass.

A polishing compound for mirrors, where little friction is required, is best made by dissolving one part by weight of carbonate of ammonia in four parts by weight of water. Work into this, until a paste is formed, 16 parts of finest French chalk (precipitated chalk, free of grit). This may be colored with a very little aniline color to suit fancy and put up in cake form, when it is moistened with water and applied with a soft cloth or sponge, permitted to dry on the glass and then rubbed off with a chamois skin or silk handkerchief and finished with tissue paper. This will also serve for cleaning polished silver ware. For a brass polish mix 7 parts rotten stone and 1 part, both by weight, of oxalic acid. Dissolve the latter in water and add the rotten stone to form a paste, which is moistened with water and applied with a cloth and rubbed briskly, then polished with a soft cloth.

PUTTY AND CRACK FILLERS.

—1221—

Simple Test for Purity of Putty.

By rubbing a small portion of the putty between the palms of your hands and noting the odor, you can almost invariably determine the presence of mineral or petroleum oils. Another test is to form small balls of the putty, place these on the end of a stick and hold a lighted match to the putty. If pure linseed oil it will not go into a flame, but if mineral oil or petroleum it will burn like a candle.

—1222—

Putty Removers.

Ingredients:—Quicklime, carbonate of potash or soda, soft soap. Mix equal weights of freshly burned quicklime and potash carbonate (soda carbonate is cheaper). Make into a paste with water and add about one-eighth to one-fourth its bulk of soft soap so as to prevent the compound settling too quick. For use, lay this compound on the putty to be removed and after an hour or two new putty is easily scraped off, but old putty needs softening by drawing a hot soldering iron over the putty which will soften the putty and allow it to be easily removed.

H. C. Standage.

—1223—

Good Linseed Oil and Whiting Putty.

Can putty be made by running the oil and whiting through a paint mill?

Yes, but that does not make good putty, because it cannot be made stiff and compact enough in that manner. The best putty is made by placing, say 2 gallons of pure raw linseed oil and 85 pounds best whiting in a putty chaser or edge runner mill, and when well mixed throw the batch on the floor in a fairly warm room, and after three or four days, return it to the chaser and knead it for 30 minutes longer. This is known as "sweating" the putty, a sort of ripening. Of course, the batch is made large enough to suit the size of the apparatus, the proportions given being for 100 pounds. If you so desire, you can make small batches of putty by mixing linseed oil and whiting fairly stiff, run it through a hand mill or small power paint mill, then use bolted whiting to stiffen the paste by kneading it on a block and beat it with a wooden mallet, lay aside a few days in a warm place, then beat it again, and you will have a hand-made putty that is fully equal to the article made in the chaser. But, when you consider your loss of time in doing this, we think you will prefer to purchase the machine made article, which can be had, when the proper price is paid.

—1224—

Keeping Putty in Good Condition.

When a person buys a lump of putty they want to keep it soft; we tell them to put it in an old tomato can and cover it with water, but they are not painters. I shouldn't think a practical painter would keep putty under water. Whiting and linseed oil will both absorb moisture. Why don't they scrape down the sides of the tub, level off the top and pour on a little oil to keep the putty soft? Then when they come to use it they can work in a little more whiting. Our plan is to mix up fresh putty every three or four days, and then it doesn't get hard. When putty comes back from a job we put the lump in a tub, and when there is enough we get at it with a maul and pound it up with linseed oil and whiting, and it's as good as ever. Sometimes we get a hundred pounds in little chunks from one to three pounds. We use only the finest bolted whiting and pure linseed oil, and we get better putty than any we can buy.

The Veteran Painter.

—1225—

Matching Putty to the Wood.

I want to say something about puttying up pine finish, whether it is Georgia pine or white pine. When you putty walnut or mahogany or those darker woods, you can make your putty match the wood and you won't have much trouble. But when you come to putty up pine trim, no matter how carefully you may match the putty in the beginning, in a few months the wood will darken materially and the putty will not change color, so that every nail hole will stand out as a spot of light color. I know I had one job that I was very particular about and took pains to match the putty myself. When the job was finished you couldn't see a nail hole anywhere. But six months later every nailhead showed. It doesn't make any difference whether you use white lead or whiting putty, the result is just the same. The only thing I can suggest is that the painter should provide himself with a number of sample boards of different kinds of pine and let them darken naturally for at least six months. Then, when he is puttying up a pine job, let him match those samples. While the nail holes will show dark at the start, they will soon match the woodwork, which will darken till it meets the putty.

The Veteran Painter.

—1226—

Plaster and Putty for Painters and Decorators' Use.

Such putties can be made to match any colored wood, by making a solution of glue in the usual way and mixing in some fine sawdust, together with silica or barytes and coloring it with a little yellow ocher, umber, sienna, red oxide of iron and to match the color of the wood in which the marks, cracks, etc., are to be filled. Push it in then with a putty knife in the usual way, and when dry, smooth the surface with sandpaper. Instead of the mineral matters (silica or barytes), simply sawdust of the wood to be puttied up can be made into a putty with the glue water, but it is apt to soften and fall out under dampness or moisture.

H. C. Standage.

—1227—

Putty for Car and Carriage Work.

The following gives a putty that will dry firm and hard without shrinking or swelling. And the making is simple and untechnical, being made of dry white lead mixed to a working consistency with coach japan and rubbing varnish equal; it dries hard enough to sandpaper so that the dust flies freely in 36 hours in a temperature of from 65 to 70 degrees, and other conditions being equal, it will not bulge nor shrink.

In some shops this formula is varied to read dry white lead, 3 parts; keg lead, 1 part, mixed to working consistency in equal parts of coach japan and rubbing varnish. This is a little slower drying putty than that made by the first formula, but it is perfectly reliable.

—1228—

Putty for Railway Coaches.

To make a good, hard, drying putty for the outside of railway coaches:—

Take, by weight, one part of whiting to three parts of dry white lead and mix to the proper working consistency with equal parts of outside car rubbing varnish and coach japan. If for Pullman or other dark colored surfaces, shade the putty by the addition of a little lampblack. For red surfaces, cast the putty in that direction by adding Indian red.

—1229—

White Lead Putty for Car Work.

A formula for a good white lead putty for use in street car work was wanted, the inquirer having had trouble on account of putty falling out of screw holes.

The best putty for that work is made by thoroughly mixing to very stiff consistency pure dry white lead with equal parts of coach japan and rubbing varnish. It should be thoroughly kneaded and hammered on a block of hard wood. This, when colored to suit the work in hand, is the best all around putty for the car or carriage shop. To fill up screw holes, a good sticking putty, and one that will not drop out or shrink, is made by adding a trifle of dry lamp-black to pure white lead and mixing the same thoroughly with three parts of coach japan to one part rubbing varnish. In using this putty, wet the putty knife with turpentine, press the material into the screw hole firmly and smooth off.

—1230—

Liquid Putty for Greenhouse Sash.

How is liquid putty made so that it can be used with a mastic machine on sash of greenhouses?

Purchase under guarantee from the makers pure linseed oil and whiting putty that contains 10 per cent. pure white lead and mix with it sufficient boiled linseed oil to make it run freely from the machine. Putty for glazing greenhouse sash must be well sweated or it will give trouble by sweating out on the job. You cannot afford to make this putty yourself, as it would not pay you unless you are in possession of a putty chaser.

—1231—

Crack Filler for Hardwood Floors.

The best floor crack filler is made by mixing 1 part litharge, 2 parts plaster of paris, 1 part glue, 8 parts water, 4 parts cement, which are intimately mixed and to which mixture is then added 2 parts sawdust, 5 parts casein, 30 parts water, 3 parts ammonia and 3 parts burnt lime.

A more simple crack filler can be made by mixing 1 part slaked lime and 2 parts rye flour with boiled linseed oil to a paste. Still another is made by dissolving 1 part white glue in 16 parts by weight of water and when this size is nearly cold, stir into it fine hardwood sawdust and finest bolted whiting or pulverized chalk in equal quantity sufficient to make a smooth paste.

—1232—

Composition of Swedish Putty.

Swedish putty, which is a putty used to stop-cracks in painted walls, is well known to the painters in England and Continental Europe, but is not used to any extent here, probably on account of its slow hardening. It is prepared by adding to ordinary flour paste a portion of chalk (whiting) and boiled linseed oil. The quantity of boiled oil should not exceed 10 per cent. by weight of the total mass. For instance, for $2\frac{1}{2}$ pounds well-cooked stiff flour paste take two pounds dry cliffstone paris white or gilders' whiting, bolted, and $\frac{1}{2}$ pint boiled linseed oil and mix and knead well together. It will serve very well for filling shallow cracks or other uneven places in plastered walls, and when dry can be sandpapered or may be rubbed with pumice and water, but it dries rather slowly and therefore it is best to fill deep cracks with plaster of paris to within one-sixteenth of an inch of the surface, and when this has hardened level off with the Swedish putty.

—1233—

Putty for Stucco and Relief Work.

So far as we know the putty used for correcting imperfections in stucco ornaments is composed of the mass used in forming them, which is recalcined plaster of Paris, fine whiting and weak glue size. To fill in defective places in relief work the putty should be made from plaster of Paris, dry white lead, bicarbonate of soda and water. Proportions are usually 1 pound plaster, $\frac{1}{4}$ pound white lead and 1 teaspoonful of bicarbonate of soda. The baking (bicarbonate of) soda is dissolved in the water and the white lead sifted fine and mixed to a soft batter with the water, then the plaster and more water is added and the whole mixed to a medium stiff mass.

—1234—

Protecting Cement Walls from Attack by Ammoniacal Liquors.

A painter wrote that tank walls of concrete are affected by weak ammoniacal liquor, and wanted to know of a means to prevent the action.

We quote from "Rustless Coatings," by M. P. Wood, page 165, on painting of brick walls, the following—"Herr William Cremer, superintendent of the gas works at Ems Rirchen, Germany, states that the ammoniacal liquor from gas works, even in the weakest solutions, detrimentally affects the cement and tank walls exposed to its action. Coating the surfaces thus exposed with liquid glass (tungstate of soda) protects the cement, also renders the surfaces quite leakage proof, even in very old work."

—1235—

Sculptor's Putty or Molding Compound.

Two parts by weight of kaolin or powdered soapstone (bone dry) and 1 part of wheat flour are stirred into 3 parts of melted white wax, not too hot, and well kneaded before cooling. The mass may be colored to suit. Modeling clay can be made from dry clay mixed with glycerine in place of water, but must be thoroughly kneaded with the hands if the mass be small, while for large masses a power kneading and mixing machine similar to those used in steam bakeries is necessary. The modeling clay should be moistened with water every few days and covered with wet cloths.

—1236—

Iron Putty for Steam Joints.

Two parts by weight of mineral red or brown in fine powder, 1 part by weight of litharge in powder (not granulated) and 3 parts by weight of iron borings, sifted, are intimately mixed and kneaded with boiled linseed oil to the consistency of a stiff putty. For close joints, fine iron filings are used in place of the borings.

—1237—

Filler to Answer for Both Hard and Soft Woods.

The very best filler that we know of for this class of work is shellac varnish, but we take it for granted that you want a shellac substitute, something that will cost you far less than shellac varnish. Take, say two pounds ground silex or the same quantity of finely pulverized china clay, stir into this one pint of good liquid drier, beating the mass thoroughly; then add gradually while stirring three quarts of extra light hard oil finish or a good, pale furniture varnish; let stand awhile and then strain through a fine sieve. If too stout to work freely, thin with spirits of turpentine. The silex or clay must be bone-dry.

—1238—

Filling Cracks in Plastered Walls and Preparing for Painting.

If cracks or holes in plastered walls have been filled by the plasterer, the plaster consists generally in part, at least, of fresh lime. In this case soak the new plaster with strong vinegar and let it dry after giving it all the vinegar it will absorb, then go over the same places with a size made of two parts linseed oil, one part turps and one part japan, and when this is dry and hard, put on a thin coat of white shellac varnish over the whole wall before painting.

When the painter is obliged to fill cracks in old walls that are to be repainted, the safest way to proceed is as follows: Cut out the cracks in the shape of a V and level the edges then after cleaning out the loose plaster or sand, mix some fine plaster of paris with thin glue size and fill up the cut-out cracks with this material to within an eighth of an inch of the surface and let it become dry and hard. Now paint over the filling and the edges of the crack with a fine pointed brush and let this dry, then level up with white lead putty, which is made by mixing dry white lead with coach japan and as much glazier's putty in bulk as there is of white lead and japan. When this has dried hard take a block of wood and sandpaper, and smooth down the filled portion, so as to bring it to a level with the remainder of the wall. This done, the sandpapered portion should be given a thin coat of paint to match closely the old paint. If the wall has not been painted before, this coat of paint should be white. Treated in this manner, cracks will not show through.

—1239—

Best Putty for Glazing in Hothouses.

The very best putty we know of for the purpose mentioned is to boil paint skins with linseed oil until they become so soft that they may be put through a paint strainer and give a fine gummy paint of fairly stout consistency. This paint is mixed with bolted whiting and powdered litharge, ten parts of the former to one part, by weight, of the latter, until it is of the consistency of soft putty, when it is laid on the frame with a putty or glazier's knife and the glass imbedded therein. More whiting is used to stiffen this putty for the final application, which is effected in the same way as in ordinary glazing. Commercial linseed and whiting putty is not durable for glazing hothouses, because of the action of the moisture within and that of the sun without. The preparation named will answer where the framework is iron, as well as on wood.

—1240—

Paste Wood Fillers.

Paste fillers for hard woods are made from any of the following materials, or a combination of these:—Silex or silica, terra alba, whiting, china clay, starch, rye flour and sometimes barytes. Silex or terra alba will, on drying, give the least discoloration to the wood. The pigment should be of impalpable fineness and intimately mixed to a stiff paste with one-third each of pale linseed oil, pale gold size japan and turpentine. The paste may be either run through a mill or be given a very thorough mixing, and to test it for quality it should be thinned with turpentine to the consistency of a varnish, applied with a varnish brush to open grained wood, preferably oak, allowed to set for about 20 to 30 minutes, and the surplus filler removed by wiping across the grain in the usual manner. After 24 to 36 hours, the surface should be lightly sandpapered and a good, flowing coat of rubbing varnish applied, which, when fairly well set, should not show any pitting or pinholes. Should it pit, however, or show pinholes or needlepoints, the filler is defective in binding properties and the portion of japan should be increased with a corresponding decrease in the proportion of turpentine. The linseed oil and the gold size japan must be of good body; and if cornstarch or rye flour is used in connection with silex or silica, the proportions should be about one of the former to five of the latter by weight.

—1241—

Filler for Yellow Pine.

The only filler for this wood is good, pure shellac varnish. Other substitutes will not answer, because there is too much sap in this timber. If good grain alcohol shellac is too expensive, use orange or brown shellac dissolved in wood alcohol, but do not substitute rosin for shellac. Every other filler will turn white or will eventually scale, taking the top coats of varnish with it

—1242—

Softening Hard Putty and Taking Out Window Panes Without Breaking the Glass.

Take three pounds of quick stone lime, slake it with hot water, then add one pound American pearlash. Have it in the consistency of a soft paste, and apply it to both sides of the glass where it is laid in the putty; let it remain for twelve hours, when the putty will be soft and the glass may be taken out without breaking. The putty can then be removed easily by scraping. Soda ash or caustic soda may be used in place of the pearlash. When the putty has been scraped off, the surface from which it has been removed should be washed with vinegar and allowed to dry before the new glass is put in.

—1243—

Putty for Light Woods That Are to Be Finished in the Natural.

For this kind of work the regular glazier's putty will not answer, as it cannot be colored to make clear tints. Use white lead putty, made by mixing and kneading three parts of finely sifted dry white lead and one part of bolted whiting with boiled linseed oil to a stiff mass, which is stained with a little raw sienna for pine lumber, yellow ocher for oak, raw and burnt sienna for cherry, burnt sienna for mahogany, burnt sienna and burnt umber for walnut, and raw umber for antique oak. With this the nail holes, etc., are puttied up, after the wood has been filled and before any varnish has been applied. Surplus putty is removed with the edge of the putty knife, taking care not to dig into the wood. To make a smooth job of puttying, go over it with a piece of fine sandpaper. For a hurried job, add some japan to the boiled linseed oil when preparing the putty.

—1244—

Green Filler for Natural Oak and Green Glaze for Oak Graining.

The most durable green glaze is made from French verdigris, ground to the utmost degree of fineness in varnish and thinned with varnish for application. If there is no haste about drying, it may be used, ground in oil and thinned with oil and the necessary driers. Should the tone of verdigris be too bluish, a mixture of verdigris and yellow lake will give a very rich green glaze of the sap green tone.

As to a green filler for oak, any good grade of light paste wood filler may be stained with terra verte or green earth, chrome green being too opaque, or verdigris may be used, very little being required. Malachite, the natural mineral green, is not to be had readily, and the aniline color sold under that name is not fast to light. To make a green stain for natural oak, one that will not fade on being exposed to strong light, and will be inexpensive, we should recommend the use of chemically pure chrome green, toned with a strong raw Italian sienna of yellow tone and light gravity. Very little coloring matter is required for such a stain, and, though more costly than one made of aniline dye, it outlasts the latter fifty to one. We cannot give proportions, which depend entirely on the strength of the material and the effect desired.

—1245—

A Good Putty for Large Cracks and Holes.

Chop up paint skins quite fine and mix with boiled linseed oil, then stiffen up with boiled whiting and knead thoroughly to the consistency of glaziers' putty. The properties of this putty are its great elasticity and greater drying qualities as compared with ordinary whiting and linseed-oil putty, because with the paint skins a body is entered which possesses the drying as well as the elastic properties to a great degree, as well as toughness.

—1246—

Best Way to Make Liquid Wood Filler.

Take, say two pounds of finely pulverized silex or China clay, which stir into one pint of good liquid drier, beat into a fine mass, then strain through an ordinary sieve with the aid of a brush, so that all the lumps are thoroughly broken up. Then add to this paste, while stirring continuously, say three quarts or one gallon of a good, pale furniture varnish. Let it stand awhile and then strain through a fine strainer or sieve. See, above all, that the silex or china clay you use in this mixture is bone dry. We would add, however, that you may find it cheaper to buy your liquid filler ready made, after counting up the cost for material and labor.

—1247—

Glazing Putty for Metal Sash.

Commercial putty, as sold in the open market for glazing, is unfit for glazing in metal sash, because it is usually made in an imperfect way from inferior whiting or marble dust with putty oil (mineral oil). Even pure linseed oil and whiting putty, while all right for primed wooden sash, will not give good service in glazing metal sash. It requires a putty that contains at least ten per cent. basic carbonate of lead (dry white lead) and ninety per cent. carbonate of lime (whiting from pure chalk) in the pigment, kneaded in a putty chaser (edge runner mill) until thoroughly united with two gallons of pure raw linseed oil or kettle-boiled linseed oil. Then the mass should be thrown out onto the floor or a platform and permitted to rest for three or four days. (This is termed sweating the putty.) Before packing the putty for sale, it is put back into the chaser and rekneaded until perfectly smooth, without adding more oil. This same process was applied to putty by the painters in the olden times. The whiting and oil were run through a hand mill, the mass thrown on a block or heavy bench, when more dry whiting or white lead was added and the apprentice with a maul or mallet of wood pounded the mass until it became so stiff that it would not adhere to the hands. The addition of a small quantity of red lead to white lead and whiting putty will increase its adhesion to metal sash.

The best putty, however, for metal skylight glazing is made from oil paint skins, and the metal workers in the East are using many tons for the purpose. Of course, the skins must be soft, to which condition they may be brought by running through stone or iron mills or by boiling in a kettle over a fire. The soft skins are run through a mill with enough whiting to make the putty of the right consistency, and the skylight glass is laid in it. There will be no falling out of putty and no leaks. Should you be unable to procure enough paint skins for the purpose, then use the putty made with white lead or with white lead and red lead, as outlined above. But you will find that the paint skins will do the trick and give you an outlet for waste oil and paint.

—1248—

Swedish Spachtel Kitt (or Crack Filler).

Spachtel kitt, or in short called spachtel, is what we know here as ordinary linseed oil and whiting putty, to which, if wanted white, about 10 per cent. dry white lead in powdered form is added by kneading and pounding on a wooden block with a mallet. It must be so free from excess of oil that it will not adhere to the spatula when the latter is moistened with water. Swedish spachtel or putty is prepared by mixing intimately flour or starch paste with best bolted chalk (Cliffstone whiting) to which 10 per cent. of rubbing varnish is added. When used in thin layers as a surfacer it can be sandpapered or rubbed on drying.

—1249—

The Best Material for Hard Wood Fillers.

The use of starch or flour for filling hardwood is pretty much a thing of the past, though starch may be still used in small portions in some of the silex fillers to hold them in suspension or make them work smoother. There was a time not so many years ago when a certain brand of high reputation was made up with silica or ground quartz and a small portion of flour middlings. But we may say that this practice has been abandoned. Still, there are hardwood fillers made of barytes, clay, gypsum, whiting, and other earthy substances, with or without the addition of a small percentage of cornstarch, but these are used to cheapen cost and large consumers will not use them. Cornstarch fillers are soft and easily applied, but will not hold up the varnish, even if several coats are given, as well as one coat of a first-class silex filler. But there is a difference even in silex fillers. Unless the silex selected is as nearly pure as can be had and contains a portion of other earthy material, it will not give the results that are had from an extra fine, water-floated pure silex. With such all that is required is the proper kind of mixture of oil, japan and varnish to bind and hold it in the grain of the wood and make varnish stand out in fine shape.

—1250—

Crack and Crevice Filler.

A first-class filler for small cracks is made by mixing cornstarch with one part coach japan and two parts copal varnish to the consistence of stiff putty, pressing it into the crack or crevice with putty knife or spatula. It is best to first oil to the crack or crevice and if the first filling does not come to a level with the surface, repeat the operation, wetting putty knife or spatula with turpentine. This filler may be stained to match the floor or finish of the wood. For ordinary floors the most economical crack filler may be made by mixing one part of air-slaked lime (sifted) and two parts rye flour with boiled linseed oil to the consistency of soft putty. Another cheap filler is made by dissolving four ounces white glue in one-half gallon water and when the solution has cooled down to lukewarm stir in enough of a mixture of fine hardwood sawdust and bolted whiting to make a paste.

—1251—

Crack Filler for Common Pine Floors.

If the cracks are not over one-quarter inch in width, would suggest that you take linseed oil and whiting putty, such as is used for glazing window sash and knead it to a stiff mass with some dry white lead, adding enough dry color to make it nearly the color of the paint you desire to apply to the floor. To make it dry fairly quick and hard, add a little japan. Before applying this putty to the cracks dip a fitch into boiled linseed oil and apply it to the sides of cracks

or joints so that the filler will not shrink away from the wood. Then firmly press the putty into the joints with the putty knife and smooth it even with the floor by wetting the knife with turpentine. When the putty has hardened any surplus may be removed by going over it with coarse sandpaper. For wide cracks or joints, after they have been cleaned from dust and dirt and oiled as above on the sides, an unshrinkable putty, made as follows, is best:—Soak a lot of blotting paper in water, squeeze out the water, then mix with whiting and thin glue size by kneading into a stiff mass with enough dry color to nearly match color desired for floor. Press firmly into the joints or cracks, allow to become hard enough, so that any surplus may be removed with sandpaper on level with floor.

—1252—

Coloring Putty for Surface to Be Coated with Hard Oil Finish.

What to mix with putty used for nail holes on surface to be finished in hard oil so as to avoid having the putty show through the finish.

Color your putty with raw sienna if you use light hard oil, for dark oil use a trifle of burnt umber with the raw sienna.

—1253—

Putty or Cement for Fastening Iron Posts Into Stone or Concrete.

The following is the best that we know of, because it has the advantage of being specially moisture resisting, preventing the rusting of the metal that is imbedded in it: Fifty parts, by weight, of Trinidad or Cuban asphaltum and $12\frac{1}{2}$ parts, by weight of brimstone (sulphur) are carefully melted, and when the mixture has reached the liquid stage, 25 parts, by weight, of iron filings are stirred in. After removing from the fire a moderate quantity of pure spirits of turpentine may be added in order to keep the mass more plastic. When it has thickened to such an extent that it cannot be poured from a ladle into the opening in the stone or concrete work, in which the iron posts are to be fastened, sufficient of the mass is placed in an iron ladle and made liquid by holding the ladle over a fire, taking care, however, that it does not take flame. The asphalt may be replaced by a mixture of equal parts of hard coal tar and asphaltum.

—1254—

Cement for Filling Fire Cracks in Faience and Other Glazed Earthen Ware.

For Faience or Majolica ware a zincoxy chloride putty or cement is the best material, and this consists of a mixture of freshly calcined zinc chloride, which sets in a very short time to a white and very hard mass. On this account, it must be used at once after it is prepared. To prepare it proceed as follows:—Make a paste of zinc oxide with water, to which has been added 2 per cent. nitric acid. When the paste has dried out some place it in a porcelain dish and heat to white heat, and when cold grind to an impalpable powder and immediately place this powder in an airtight container, so that the calcined zinc oxide does not attract carbonic acid from the air, which would diminish its binding properties. When a portion of this powder is mixed with a solution of zinc chloride of from 30 to 50 degrees Be, the resulting cement will become stone hard in a few minutes. If it is desired to have it set more slowly, the zinc chloride solution may be used less concentrated or 2 per cent. of powdered borax may be added to the zinc oxide. The zinc oxide powder may be tinted with dry colors in fine powder of the proper tone or the filled-in fire cracks may be touched up with the proper color in varnish.

For ordinary glazed ware a zinc oil putty or cement will be sufficient. This is prepared pretty much in the same manner as glaziers' putty, with the exception that instead of lead or whiting, zinc oxide is used as the pigment, being rubbed up or kneaded to a stiff paste. The more this is worked over and kneaded the more and better its power of binding. This putty or cement is best kept in tin containers that are made air-tight by pasting paper bands around the covers, and if so kept from admission of air the cement will keep for years and even gain in uniformity of consistence.

—1255—

What Function Has Corn Starch in Paste Fillers for Wood?

Some 30 or 40 years ago mineral fillers for wood were almost unknown to the old-time painters, rye flour or starch being used entirely for the purpose, until Wheeler, of Bridgeport, Conn., conceived the idea of using silex or silica for the purpose and had his method patented. Then it was found that the fillers made from flour or starch were not equal to the mineral fillers, because finishes on top of the former, when rubbed with water, swelled, while the latter did not.

The old formula was generally as follows:—Two pounds of either corn starch or rye flour, beaten to a stout batter free of lumps, with one pint boiled linseed oil, one pint coach painters' japan and one pound finest pumice stone, powdered, and a half pint shellac varnish, thinned for use with turpentine.

When desired for darker effects, finely powdered dry pigments, such as raw or burnt sienna, burnt umber, Vandyke brown or drop black were added.

Furniture manufacturers and wood workers at this time use mineral fillers with anywhere from 25 to 50 per cent. corn starch to keep the mineral pigment from settling and caking after thinning same for use.

—1256—

Putty to Cover Defects in Galvanized Iron Cornices.

Take equal parts by measure of zinc dust and gilders' whiting, and mix this to a stout putty-like paste with silicate of soda (waterglass) of 33 degrees Be. gravity. If you cannot obtain zinc dust, take dry zinc oxide instead and color the paste with enough graphite to approach the appearance of galvanized iron.

When using this putty, scrape the defective place in the metal clean with knife or scraper, and fill the defect with the material, which will harden in less than six hours, and if the work is to be fine and smooth, use an agate pestle to polish it. This putty is waterproof and will adhere to glass and stone as well.

WHITEWASH AND WATER PAINTS.

—1257—

Whitewash for Exterior Surfaces.

Take one-half bushel of freshly burnt lime and slake it with boiling water, cover it over during the slaking so as to keep in the gases that are generated. Sift the mixture through a fine sieve, and add to it seven pounds of salt previously dissolved in sufficient warm water; three pounds of ground rice boiled to a thin paste and stirred in boiling hot, half a pound of powdered Spanish whiting, one pound of glue (which has previously been dissolved by soaking it well and then heating it in a glue pot); add five gallons of hot water to the mixture, stir it well, and let it stand a few days covered free from dirt. It must be put on quite hot; for this purpose it can be kept in a vessel over a portable furnace. About one pint of this wash will cover a square yard.

A simpler whitewash is prepared by mixing to a batter half a pound of wheat flour with cold water, and making it into a paste by pouring on it boiling water to thicken it, and pour this paste into a pailful of lime and water which has been mixed in the ordinary way of whitewash. Stir all well together. *H. C. Standage.*

—1258—

Durable Whitewash for Outside Use.

A whitewash that will not rub off or wash off in rainy weather can be made by mixing one-half pint of flour to a batter with cold water, then stirring into this boiling water until it becomes a thick paste. While still hot it is poured into a pailful of ready made lime whitewash and well stirred in.

Another simple method is to add to two gallons of ready made lime whitewash one-half pint each of molasses and table salt. Must be stirred frequently while being used.

—1259—

Whitewash as Specified by U. S. Government.

The recipe for mixing whitewash according to government specifications was wanted.

Take of fresh Rosendale cement 3 parts by measure, of clean, fine sand 1 part by measure, mix with fresh water very thoroughly. This makes a sort of granite color, dark or light, according to the color of the cement and sand. If the color is desired nearly white, use 2 parts fresh lime, slake this first, then add 1 part cement and 1 part white sand. For a brick red color, Venetian red is added to the first mixture; for buff color, yellow ocher is added. The wash must be made as thin as can be conveniently applied with a whitewash or large kalsomine brush. Before applying the wash, the surface must be wet with clear water, so as to give the wash an opportunity to hold out until it sets. It is admirably adapted for brick and stonework or rough fences, but will not work over paint or whitewash. It should be kept well stirred during application.

—1260—

Cold Water Paint for Interior Cement Surfaces.

Can such a paint be made from whiting and glue, and what glue should be used? It is to be used on a large surface of cement.

The paint you have reference to is the usual kalsomine preparation for walls and is made as follows, according to the formula given us by L. C. Reitze, of Denver, Col.: 200 pounds of gilders' bolted whiting and five and one-half pounds

of gelatine (a good grade of uncolored animal glue), are mixed separately in water and allowed to stand over night, then next morning both are heated to the boiling point with steam, then thoroughly mixed. This paint is in paste form, and is thinned for use with cold water. Cold water paints are usually patented and to imitate them is an infringement, and it would pay you to purchase the dry material from the manufacturers, unless you are prepared to make the kalsomine by the formula above referred to.

—1261—

Preparing Kalsomine.

Dissolve one pound white sheet glue in hot water, after it has been soaked in cold water. Make a saturated solution of alum in water, then mix 25 pounds of bolted English cliffstone parts white in water to a stout paste and add to this the alum solution, then add the liquid glue and test the mixture for its binding properties, and if it does not bind well add more glue and let it stand to cool. If the kalsomine is to be tinted, use distemper colors, i. e., colors that have been ground fine in water, but avoid colors that are affected by lime, such as chrome yellow, chrome green, Prussian blue, etc., and the tinting colors should be added to whiting mixture before the glue is put in. To determine whether the tint is satisfactory, dip a piece of paper in the mixture and let it dry. When ready to apply it thin with cold water to required consistency and use good kalsomining or wall brushes. Lay your work off evenly and avoid laps. If an edge dries, stop and wet it up with a clean brush and clear water and do the same where you have missed a spot and finish up with kalsomine. Should your kalsomine dry too fast, slow it up with glycerine, say one-quarter pound to two gallons kalsomine, for in that case you have too much glue and alum and your kalsomine is liable to crack and flake. Practice a little about your shop or your own house, and you will soon determine the proper relation between pigment and binder.

—1262—

Kalsomining Old Whitewashed Ceilings.

Whether it works well or not, it is unsafe to put kalsomine over old lime whitewash or old kalsomine, because of the tendency to flake. Kalsomine is stronger in its binding properties than ordinary lime wash, therefore it requires a strong ground. To remove old lime wash or kalsomine is often a difficult and expensive task, and it is better to bind the old coating down before beginning to apply the kalsomine. To do this effectively, proceed as follows:—If the walls or ceiling have been whitewashed, and it does not pay to take it off, wash the surface with strong vinegar and, when dry, give a good coat of glue size or, better, two thin coats, applied fairly warm, and have the room as warm as possible. This makes as good a foundation for kalsomine as can be had on old lime wash. On old kalsomine that cannot well be removed, apply one or two good coats of alum and glue size, which is prepared as follows:—Dissolve one pound of white rosin soap in hot water; after slicing the soap fine soak one pound of white sheet glue in cold water until soft, pour off the surplus water, stir the glue and put in boiling hot water until the glue is thoroughly dissolved and liquid. Now dissolve two pounds of alum in hot water, then stir the liquid glue and soap water together and add the alum solution. Then thin the mixture with warm water to working consistency. This makes a safe ground on which kalsomine will work very well.

—1263—

Lime Whitewash—How to Prepare and How to Apply Properly.

The principal point in preparing lime whitewash is to have the lime well slaked. Select good builders' lime, soak it with warm water and allow it to fall into fine powder in the open air. Then, if wanted for inside and so prepared that

it will not rub off, make it very thin with water and to every pail add a pint of flour, previously made into starch or paste; or, better still, dissolve two pounds of ordinary alum in boiling water and add this solution to every two-gallon pail of whitewash. Apply the first coat very thin, so as to bind it on the wall and the addition of alum will prevent the second coat from rubbing up the first coat, thereby making a more uniform surface.

For outdoor work, take one pound of lime and slake it as above. Then take one-quarter pound Burgundy pitch and dissolve by gentle heat in a pint of linseed oil; now add to the hot lime one gallon skimmed milk, then the mixture of pitch and oil a little at a time, stirring all the while. Finally add three pounds of bolted whiting. If too stout to work evenly, add more skimmed milk.

The addition of one part of salt to three parts by weight of lime, or thinning the unslaked lime with the brine of a mackerel or salt herring barrel, will also make a whitewash with enough binder to stand the weather.

—1264—

Removing Whitewash from Ceiling Before Kalsomining.

Soften the whitewash by wetting it liberally and repeatedly with a solution of two pounds potash in five gallons of water, and when softened, remove with a scraper.

—1265—

A Good Formula for Preparing Kalsomine.

This is used by the foremost firm of painters and decorators of one of the most thriving cities in the Western part of the United States.

One pound of uncolored gelatine glue, as free from grease as possible, is soaked over night in cold water sufficient to cover the glue. Thirty pounds of English cliffstone paris white, bolted or best bolted gilders' whiting, is also soaked in sufficient water to make a paste over night, and next morning both are heated with steam or over a moderate fire in a water bath to the boiling point, and when the glue is fully dissolved the two materials are thoroughly mixed. In summer time on cooling a small portion of carbolic acid, say about one-eighth of an ounce, diluted with water, is added for each pound of glue used in the aforesaid formula to keep it from souring, and in this way the kalsomine will keep for some weeks. It is said that the workmen rather like this preparation, because of its good working properties.

—1266—

To Make Kalsomine Without Heat.

Is there any way to make kalsomine without heating it and, if so, would it apply to deep wall colors that do not contain paris white in their composition?

Kalsomine can be prepared without the use of heat. If you make liquid glue by soaking, say one pound of best white or pale sheet glue in water over night and then melt the glue in the ordinary way with enough water to make it quite liquid, stirring into it about twenty pounds best gilders' bolted whiting or Cliffstone paris white, beating it until all lumps are well broken up, then straining the mixture through a fine wire sieve or cheese cloth and finally thinning with cold water to the consistency of rich milk, you will have a kalsomine that will answer any purpose for clear white or, if colors mixed in water are added, for any tint. To keep from souring add a teaspoonful of refined carbolic acid or oil of cloves. For deep colors that will not bear addition of whiting the addition of liquid glue will supply the required binder, but in very strong, like Chinese blue, it is desirable to use china clay in place of whiting, because the latter acts badly on the blue and to use the blue alone is undesirable. Dextrine has been used in place of glue, but it is safest to use the best gelatine or animal glue.

—1267—

Cold Water Paints, Kalsomine and Whitewash.

In what way do most of the cold water paints on the market resemble kalsomine or whitewash, or in what way do they differ from these?

If you refer to the cold water paints containing casein that are sold in dry powder with directions how to prepare for application, we may say that they resemble whitewash because, like that material, they contain quicklime and kalsomine; because, like that, they contain glue (or cement), though in another form. Casein is obtained from milk, and milk consists of water, sugar, casein and fat, the last three ingredients being in about equal proportions. When the fat (butter) is removed from the milk, the casein may be precipitated, purified by washing and dried, when it comes into the market as a white powder, which is soluble in a solution of any alkali in water, thus furnishing the binding medium for cold water paint. The casein being mixed with lime and the dry cold water paint powder being mixed with water, the casein is dissolved in the lime water and combines chemically with the lime present, and when applied to any surface becomes insoluble on drying, which accounts for their weatherproof qualities.

—1268—

Non-Uniformity in the Drying Out of Kalsomine.

Why new ceilings that have been sized with hot glue, soap and alum size often show up murky and uneven after drying when kalsomined with light tints, especially when dry-glued colors are used.:—

Your glue, soap and alum size make a first-class foundation for kalsomining, although in many cases a simple glue size is sufficient, and in some cases the size may be dispensed with. It all depends upon the condition of the walls and ceilings. On very porous plaster the size is necessary, otherwise too many coats of kalsomine would be required, while on smooth, hard, non-porous plaster, thin glue size, applied hot, is sufficient or no sizing at all is required. We think that when, as you say, adjoining closets dry out fine without sizing, it is due to the small area of surface, while on the larger surfaces the edges dry up too fast so that laps are sure to show, unless you wet up the dried edge with a clean brush and clear water. This will happen, especially if you have too much glue in your color or tints, and if such is the case you had best add a moderate quantity of refined glycerine, not over two tablespoonfuls to an ordinary pail of paint. We believe it hardly needful to suggest that on large ceilings two men should work together from one and the same scaffold, which goes far to prevent unevenness, because in that case the edges have no chance to dry, especially when the operators work diligently. We would also advise against the use of dry glued colors and recommend colors ground in water for tinting kalsomine.

—1269—

Background for Painting in Distemper.

The ordinary background for distemper painting, whether it be on wood or cloth, consists of finest whiting and gelatine size or of plaster of Paris (burnt gypsum) stirred in water, so as to lose its setting property, strained and mixed with size. Often a mixture of whiting and plaster are used. The ground is laid directly on the wood or cloth without previously sizing the same. The size is made from parchment or fish glue or equal parts of these, dissolved in clean water. An excess of size will cause the ground to crack, it must be made so hot that it is still somewhat absorbent.

—1270—

Whitewash for Interior Walls and Ceilings.

A. B., New Bedford, Mass., writes:—I should like to have some information regarding interior whitewashing. I whitewashed some ceilings with good slaked lime that was slaked two or three days before. The first coat worked all right, but the second coat crawled and spotted all over the sidewalls, and yet the third coat was again all right. In another case I had the ceiling peeling a day or two after it was dry. Can you account for this?

Answer:—Always slake your lime with boiling water and cover the tub or barrel with sackcloth or burlap to keep in the steam. When the lime has all broken up keep it covered with water; never let it dry up, for then it becomes useless. After you have thinned down your slaked lime to the right consistency for application add two tablespoonfuls of salt to each pail of the wash, also one pound of flour, previously mixed with hot water, stirring it in thoroughly. This will give good binding property to the wash and keep it from peeling, nor will it rub off when dry. If the wash is to be thin one-half pound of flour to the pail will be sufficient, especially when it is to go on a sandy wall.

If the whitewash works poorly or comes out spotted, one ounce of potash alum dissolved in water and added to a pail of whitewash will correct the trouble, but too much alum is liable to make the whitewash scale. A good, hard drying whitewash that will not crack or peel can be made by slaking thirty pounds of builders' lime with hot water, keeping in the steam for at least twelve hours. When diluted add to the wash two pounds of zinc sulphate and one pound common salt previously dissolved in water. It is not good practice to use glue as a binder for whitewash, and at any rate if the glue is not first class or has not been dissolved thoroughly, it will make the wash crawl and spot as you have stated. If you have to whitewash any surface, wall or ceiling that has been greasy it is best to wash it first with vinegar before applying the whitewash. It is an important point that brushes and pails, etc., are clean, and the wash should be strained.

—1271—

Cold Water Paint Applied with Spraying Machine.

How much more paint will be required when using the spraying machine as compared with brushwork? How many square feet of straight wall may be covered in a day's work by either method? What quantity of water, generally, can be added to one hundred pounds cold water paint for use in the spraying machine?

These questions are rather difficult to answer with any degree of accuracy because of the variations in the spreading capacity of the various cold water paints on the market, and the difference in the capacity of the various makes of paint spraying machines to say nothing of the skill of the operators in handling the spraying machine. For these reasons we can answer in a general way only, and from what little experience we have had in this line.

If the spray works well, and is handled with skill, it will not require any more paint than the amount required for application with the brush, because double the volume of water is required for thinning the paint to make it liquid enough to pass through the atomizer or nozzle of the spray than is used for brushing paint. As to the area of straight wall to be covered with a spraying machine in a day's work, it depends upon the number of men handling the machine and whether the air for the spray is produced by the hand pump or whether by pneumatic pressure. Two men, in a day's work of eight hours, with one good spraying machine should be able to spray, without the use of scaffolding, 3,000 square feet of wall space; whereas, with the use of wall brushes they would not be able to cover more than one-third the surface. In our opinion, however, the brush work will be more uniform throughout. As to the exact quantity of water necessary to thin cold water paint for spraying, you had best follow directions given by the manufacturers of the paint, or if you prepare your own, practical tests will give you the figures.

—1272—

Medium for Tempera Colors.

If you wish a free working tempera binder, take the yolk of egg, as well as the white, and make an emulsion with this and gum arabic solution. Then add a little vinegar, and strain, so as to free the emulsion from the skins of the egg white, and you will have as fine a working medium as you want without the wax, because the yolk of egg contains 30 per cent. of fat, while egg white contains only one-half of one per cent. If you do not care to use the egg yolk, you will need either oil or wax in your emulsion. We cannot give the proportions required. You will have to work them out by experiment. Egg emulsion disintegrates rapidly; therefore we would suggest adding a few drops of oil of cloves or camphor to conserve the emulsion for a reasonable time. Our suggestion is that you make the medium out of as few ingredients as possible, because too great a number would be liable to cause trouble.

—1273—

Kalsomine: Its Composition and Uses.

1. What is the meaning of the word calcimine or kalsomine, as known to the paint trade?

2. Are kalsomines supposed to be used on exterior work, cellars, air lofts, etc.? Does the painter consider cold water kalsomines to be identical with cold water paints?

3. What alkaline or other injurious substance that would affect ceiling varnish would be found in cold water kalsomines?

The term kalsomine or calcimine is adopted for a glue, whiting and water paint that is applied cold, similar to, but less expensive than, distemper. Whiting, being carbonate of lime, and calcium being the chemical term for lime, has furnished the name for the material. Kalsomine, as prepared by the painter, is for interior work only and will not stand exterior exposure. The cold water paints are made up on a different formula, the binder being casein in place of glue, and usually a certain percentage of oil is added to insure additional wear. They also contain more or less white pigment, such as zinc oxide or lithopone, in addition to calcium carbonate or calcium sulphate. If kalsomine is made up as it should be, from the whiting known as English Cliffstone paris white (which is pure chalk) and good sheet glue, there can be nothing in its composition that would injure or affect ceiling varnish, although enough alkali might be present to affect Chinese or Prussian blue. In such case a select grade of bolted English china clay is substituted for the whiting. Good kalsomine differs from ordinary whitewash insofar that carbonate of lime is used in place of quicklime and glue as a binder.

—1274—

Government Formula for Exterior Whitewash.

The United States Government specifies the following for painting the exterior of lighthouses:—Mix three pecks of fresh Rosendale cement with one peck of clean fine sand very thoroughly in water. This makes a sort of granite color, light or dark, according to the color of the sand used. The wash is to be made as thin as it can be used with a large kalsomine or whitewash brush. Before being applied the surface must be well wet with water, in order to make the wash hold until set. To make this wash green you have to add limeproof colors, and, as chrome green is affected by lime, you had best use yellow ochre and enough ultramarine blue to produce a green wash. If you want to keep the color light use the following formula for making the wash:—Slake two pecks of fresh lime first in the usual way, then add one peck of fresh Rosendale or Portland cement and one peck of fine white sand. Add the yellow ochre and ultramarine blue and reduce with water to the proper consistency.

—1275—

Removing Old Kalsomine from Ceilings.

To remove old kalsomine from a ceiling where the ceiling has been papered over the kalsomine, and the paper removed.

Give the ceiling a coat of raw linseed oil all over, and after two days try to scrape off the particles of kalsomine that would not yield before to dry scraping. If, after coating with the oil, the kalsomine remains still firm, it will be safe to apply the flat paint. At any rate, it is a mistake to apply these modern wall finishes on old walls over a glue or varnish size. Pure raw linseed oil is best for the purpose, especially when walls or ceilings had been kalsomined.

—1276—

Killing Water Stains in Plaster Before Kalsomining.

Hard oil finish, reduced with enough turpentine to make it dry flat, is the best size for the purpose of holding back water stains in plastered walls or ceilings. If, however, the stains are very pronounced or dark, it is best to add about five pounds of pure white lead ground in oil to one gallon of the mixture of hard oil finish and turpentine. If the kalsomine is to be a tint, then some color should be added to the white lead to approach the tint of the kalsomine.

The next best is a glue, soap and alum size, which is made by dissolving one pound of pale glue in the usual way, also one pound white ivory soap and two pounds alum, all separately, and while the solutions are hot mix them together, while stirring, adding enough hot water to give proper consistency. This size should be applied fairly warm, but not while hot. If the stains are very pronounced or dark, add a small portion of fine sifted whiting to the size. When the water stains in the walls come through from the outside, the only remedy to prevent them from again coming through is that the wall must be protected against moisture on the outside.

—1277—

Preparing First Class Kalsomine.

A prominent decorator of the far West recommends the following:—Use good bolted gilders' whiting and a good gelatine or uncolored glue, free of grease. Soak separately in water overnight 200 pounds of whiting and $5\frac{1}{2}$ pounds of the glue, and next morning both are heated to the boiling point with steam and then mixed.

To keep the glue from souring in hot weather, a preservative, such as oil of cloves, is used, when the kalsomine will keep for six weeks in summer in good condition.

—1278—

Size for Kalsomining on Hard Plaster.

We know of no better size for sand-finished walls to be kalsomined than one made as follows:—Dissolve one pound of white sheet glue by soaking it in cold water over night, and when the glue has swelled by absorbing the water, melt it in a regular melting pot. Dissolve one pound rosin soap sliced fine in boiling water, then dissolve two pounds of alum in hot water. Mix the dissolved glue and soap solutions and keep stirring while the alum solution is added. Before using the size, thin it with enough lukewarm water to the right consistency. While glue size is often sufficient without soap or alum, the above makes the best foundation.

—1279—

Cold Water Paint as Background for Signs on Exterior Cement Walls.

A low priced water paint in white that will stand the weather and not wash under driving rains after being lettered in black, ground in oil.

There are a good many cold water paints on the market that are claimed to be weatherproof, and as they are free from saponifiable oils, they should not be affected by any action of the concrete or cement in the walls, no matter how recent the construction may be. The vital question is to select a brand which has given satisfaction on other work where there has been no lettering, as placing letters, etc., made of lampblack and linseed oil, upon this surface will have no effect upon the water paint, but rather tends to more thoroughly bind the latter more firmly down and the letters will outlast by far the white ground of paint. In our opinion, the lasting of such signs will depend upon the time that may be reasonably expected, as well as the exposure it is subjected to. Sometimes and under certain conditions such experiments prove conomical and at the same time durable.

—1280—

Casein and Its Uses with Lime.

Use casein as a binder with hydrated lime, as the latter is usually employed with casein for cold-water paint. We would not recommend the use of water glass with casein, as we do not know whether your stock of casein does not already contain borax, or bicarbonate of soda, and, in such case, it would not work well with water glass. At any rate, hydrated lime is the proper thinner for the casein and 15 per cent. of the latter, by dry weight, and 10 per cent. hydrated lime is all-sufficient. For the remaining pigment whiting alone, or clay and whiting, may be used. All of which should be thinned to proper consistency with water.

—1281—

Pitting of Kalsomine on Stucco Finished Walls.

A painter said he had recently finished some new walls and ceilings of sand or stucco. Specifications called for one coat varnish size and two coats kalsomine. The work was done as specified, but thousands of small holes about the size of a pin point broke through the finished surface, showing plainly.

We believe that the trouble was due to the wall or ceiling varnish used on the job, which permitted suction, causing the appearance of what is usually termed "pinholes" in the kalsomine coatings. Perhaps the varnish was thinned to excess, thus causing the surface to remain porous to some extent. Therefore, the first coat of kalsomine sank in, instead of filling up and, naturally, the second coat on drying out showed pitting. The remedy, in your case, was to apply a soap and glue size over the pitted finish and finish up with another coat of kalsomine to avoid the trouble of removing the pitted finish. At any rate, a soap, glue and alum size is preferable for kalsomine finishes to varnish size. The best glue, soap and alum size is made as follows:—Soak over night one pound of good pale glue in two quarts of water and in the morning add two quarts more of water and dissolve the glue. In another pot dissolve one pound of yellow soap, shredded in slices, in four quarts of water, and in still another pot dissolve two pounds of alum in two quarts of boiling water. Mix the hot glue and soap solutions, stirring with a clean, wooden paddle, and add the alum solution. Put the resulting product in a package, large enough to hold about six gallons, adding enough cold water to make five gallons. This will be of the proper consistency for a hard, smooth plastered surface; it may be thinned further with one-half its volume of water.

—1282—

Shopmade Glue Sizes and Binders for Water Color or Distemper Painting.

Here are some proven formulas that may seem somewhat old-fashioned to some of the younger element in the craft, but are taken from the experience of old line master painters, who served their time at the trade during the middle of the last century. There are many ingredients that are suitable, such as animal glue, fish glue, vegetable glue, gum arabic, starch, flour, casein, yolk and white of egg, honey, etc. also soap and alum and soda or potash.

The best binder for distemper colors is prepared by querling together with a clean stubby sash tool or fitch the yolk of say four fresh eggs, four times as much linseed oil as the half of an eggshell will hold and just as much good household vinegar. When all these are well combined, the mass is poured into a bottle and well corked after adding about 15 drops of spirit of hartshorn or ammonia or spirit of turpentine. When wanted for use, the distemper color is to be mixed with this binder rather stout and then thinned with water for free flowing. In this style of painting the ground should be oil paint and the brushes used must be washed clean to keep from hardening.

For cheap distemper painting, especially on ceilings, the binder may be made by querling together say the whole of two eggs, two half eggshellfuls of good vinegar and a tablespoonful of linseed oil.

Casein distemper binder can be prepared by pouring over a portion of fresh cheese (the so-called curd from skimmed milk), a solution of soda or borax in water, which should be lukewarm. It is not necessary to weigh or measure proportions; the mixture should have the consistency of soft butter.

The pigments are then mixed with the binder, run through a hand mill and thinned with sufficient lime water to work freely under the brush.

For a good wall size on plaster surface a glue, soap and alum size is made by soaking one-fourth pound of pale glue in one-half gallon of water, then dissolving same by heat, and adding one-fourth pound alum, previously dissolved in a little hot water, also one-fourth pound white soap, cut in fine slices and dissolved in hot water. This mixture must be cooked together until well amalgamated. It works best when used fairly warm.

A comparatively cheap wall size for plastered walls on which to hang paper, or as a ground for kalsomining, may be made as follows without the use of heat:—

Starch of any kind or flour, whether wheat, rye or potato, so long as fairly fine, is mixed with rain water to a medium stiff dough, and when all lumps are broken up a lye made from pearl ash or caustic soda is added, while the dough is agitated steadily with a stout stick or paddle, until the mass shows the consistency of starch that has been cooked to a soft batter. At that point the addition of lye must cease or the size may become too strongly alkaline for the wall paper or colored kalsomine.

The lye can be made by using one pound of caustic soda or pearl ash to one gallon of rain water. It is safest to try this at the beginning in a small way, until some practice may be had. In dissolving animal or fish glue soaking over night in rain or other soft water should not be neglected before using heat.

In purchasing animal glue it is best to test its quality by tasting it on the tongue. If the taste is salty, the glue is liable to be adulterated with zinc or lead salt to give it weight and a paler color. Weigh a portion of it and soak it in water for 24 hours, take it out of the water and let it dry, then weigh again and the nearer it comes to the original weight the purer the article.

—1283—

Colors in Water for Distemper Painting.

Lampblack, although not much called for, and Vandyke brown, are most difficult to mix and handle, because of their light specific gravity. Lampblack, in addition to its light weight, is often somewhat greasy and requires a long

time to mix with the water. Both it and Vandyke brown, that is, the Cologne or Cassel brown, should be soaked in water for a few days so as to become thoroughly saturated before they are run through a mill. By soaking the material in a tub or mixer, stirring or agitating the mass occasionally, then letting it rest, the excess water can be poured or syphoned off the top and the remainder will contain sufficient water to make a good paste on leaving the mill.

If either of these pigments will not mix properly when treated, as stated, add for every 100 pounds of the dry color in the batch four ounces of carbonate of soda and one fluid ounce of liquid ammonia of 26 degrees. This will not be necessary with such earthy pigments as raw or burnt sienna, raw or burnt umber, dropblack or ivory black, carbon gas black, ultramarine, cobalt and Chinese blue, chrome yellows, chrome greens, Venetian red or the various lake colors. When ground in a mixture of 10 per cent. glycerine and 90 per cent. water, the paste color will not evaporate readily, but the addition of glycerine is not always desirable, and depends on the use made of the water color. At any rate, it is safer to cover the pulp with some paraffine coated paper, which will prevent evaporation. When putting up in glass jars for jobbers or dealers' shelves there should be a paraffine wax paper disk inside the cover.

ESTIMATING.

—1284—

Estimating Paint from Plans.

I used to think that it was close enough to estimate that the interior work on a house was just about equal to the outside work, and I would figure the outside and double it. That was all right so long as it was confined to the older houses, but it will not answer with the more modern houses, because there is a good deal more interior work than there used to be. There is too much paneled wainscot, too many floors to be finished and other special work. So I go over the work very carefully in detail. I copy the specifications and study the plans carefully, and when I am through figuring I know just how many windows and doors there are; how many running feet of baseboards; how many square feet of wainscoting, and every little detail. If there is a lot of extra work that is not clearly indicated in the carpenter's specifications, but is just referred to, such as picture and chair moldings, china closets and things of that kind, I add 25 per cent. If there are floors, I figure the number of square feet. If the walls are to be tinted, I measure them. When there is paperhanging to be done, I figure up the number of rolls of paper. I figure extra on papering halls, as the paper cuts to waste there. As a short cut in figuring I went very carefully over my own house and measured up the doors and the door trims, and got a close average for the complete door. I did the same thing with the stairs and the attic stairs. In short, I went all over the house and figured out the cost of each item. So when I have the number of doors I look at my table and have the price at once. When I get through with the whole thing I have come very close to the actual cost of the work. A painter ought to know how much material and labor it takes to do a square foot of surface. In ordinary outside painting the labor is about two-thirds the total cost. But when it comes to inside work the greater cost of varnishes and enamels makes the proportionate cost of the material come higher.

The Veteran Painter.

—1285—

Keeping Account of Cost of Work.

When I first started in the painting business I opened what I called a contract book. I would put in it the complete measurement of the house, the number of windows, number of pairs of blinds, number of doors, in fact everything on which I based my estimate. Then I would enter up the specifications and the amount of the contract. And I would open a special account with that job, charging against it all the materials and labor, and everything that came back was credited. I used to charge brushes up against each job, and cartage also should be charged. When I would get through with a job, I would know just how much it had cost me, and exactly just how much profit there was in it. There wouldn't be so many mistakes in estimating if every painter would keep a contract book of that kind. It is some trouble, to be sure, but it is worth a good deal to you when you come to estimate on painting the same house a second time.

The Veteran Painter.

—1286—

Estimating on Work.

Guessing is the most unwise habit a painter can get into. A careful estimate should invariably be made, but it must be based on the individual experience of the man who makes it and his own knowledge of what his men are capable of. Nor is he wise to say to himself:—"Now I have so and so in my employ, and he is a hustler. I can put him on the work and rush it through in a week," and quote a lower figure than he otherwise would. Unless the owner is limited to

an immediate acceptance, it may be a week or two before he decides, and meanwhile the specially rapid man may have left you or been taken sick and you may have to do the work with average men and lose money. It is your average experience that must guide you. And you must take into careful consideration the conditions of that particular job; whether the work can be done advantageously or whether the men will find local conditions that will hinder them or will make their work more difficult than usual.

There is no way for you to find out what it costs you to do certain classes of work but experience. Keep a record of the work you have done and of how much it has cost you and then carefully measure it up and tabulate the results. A cost book of this kind is invaluable. Enter on the page the name of the owner; the address and location of the house. Charge up the cost of cartage, materials, etc. Then when the job is completed, measure up the surface of the inside work, of the outside work and the like, and charge against that surface the time which your time sheets show has been spent on that particular work. For example, if you have had a man painting doors all day, let his time sheet show that he has worked on doors and how many he has finished. The daily time report takes but a minute for each man to make out and if it enters into details like this can be made invaluable to you. You will know in the future just how much it costs you to paint a door. It is the same way with wainscoting, baseboards, and the like. Set a man to doing one class of work, as much as possible, till you find out what that kind of work costs you. If you are painting a porch, make a rough sketch of the porch in your book, and set down the number of lineal feet, the width of the porch, and any other facts of interest. The total cost of painting that porch will give you an approximate idea of the cost per lineal foot of painting similar porches in the future. It is the same way with a cornice or a fence. If you have a camera, it is a good idea to make a photograph of each house you paint and paste a blue print in your record book. Such a book will, in time, be one of your most valuable business assets, for it will furnish you with the exact information of the cost of all the work you have done. The hours worked and the wages per hour should always be entered. Don't trust your memory in these details. It is well also to make notes of any unusual experiences that have caused delay, or added to the cost. After having determined the cost of doing each class of work—that is, how much it will cost you—then in future you should always measure the work carefully in order to give an estimate. So many lineal feet of baseboard, so many doors, so many windows, and so on. Set these items down, one under the other, on a cost sheet, with the price against each one. Then go over the plans and specifications again very carefully to see that nothing has been omitted. The sum of these items gives an approximate net cost of the work. To these you must add the cost of cartage and any special items of carefare or board made necessary by the location of the house. But there is always the possible chance that the work may go wrong, that the weather will cause unusual delays and that showers will make it needful for you to do part of the work over again. You must be prepared for items that the architect has omitted on the drawings and has referred to in such an obscure manner in the specifications that you could not foresee them—some little item, perhaps, under the head of plumbing or iron work that may mean a whole lot of work for the painter. It is scarcely safe in any large job to allow less than 10 per cent. for contingencies of this kind. And this is the bare cost of labor and materials. Then there is another item that must be considered before you can add your profit, and that is the cost of running the business; your own salary as superintendent, for you are entitled to a salary as much as any of your men; office rent, insurance, advertising, clerk hire, telephone, waste of materials, scaffolding, wear and tear on brushes, sponges and the like. All these are expenses that must be taken care of and the only proper method of doing it is to charge up a certain proportion of these running expenses to each job. These expenses will add from 15 to 25 per cent. to the cost already ascertained, according to the economy used in running your business. Where a large number of men are employed the expense account will be relatively less than where only a dozen men are hired. You can easily determine it. You know from your books the total cost of doing all your work

last year. You also know the total amount of all these fixed charges. Remember your own salary should be what you would demand if you were seeking employment from someone else, or what you would have to pay a competent man to take your place should you be taken sick. And, except when balancing your books at the end of the season, you should not touch your profits, that is, anything more than your salary, for your own use. Knowing the cost of the work done, and the cost of the fixed charges; dividing the latter amount by the former gives the percentage to be added during the coming year for the operating expense account. And it is well for each business man to determine this anew for himself each year. For circumstances may cause the percentage to rise, or more economical management may cause it to fall. And after all these items have been included in your estimate—and not before—you must add the percentage of profit you hope to make—10 per cent., 15 per cent., 25 per cent.—whatever you have determined upon as a fair return for the capital and business energy you have invested. For remember, the salary you pay yourself for your service is not profit. You could go out and earn that amount by working for somebody else, and run no risk from bad debts, and have no worryment over mistakes in estimates, labor troubles and all other like worries. The added percentage of profit is to compensate you for these extra risks and extra worries that you as a contractor and a business man assume.

This then goes to make up an estimate for every job of painting:—Cost of materials, labor, operating expenses of the business, and finally, profit. Is it any wonder, therefore, that mistakes are frequently made, and that it is impossible to make up any painters' price book that will even approximately indicate the prices to be charged or the value of each grade of work for all parts of a country that is more than a thousand miles from north to south and three times as long from east to west; where the cost of labor and materials and the number of hours in the working day vary as much as they do in different parts of the United States? Each painter must work out his own table of costs to suit his own local conditions and fix his prices in accordance with his own standard of profit.

Experience will often enable a man to closely approximate the cost of painting an already built house by looking at it carefully or by general measurements only, and such estimates are often remarkably accurate, because even with the most careful estimating the cost of labor is but an approximation. And, moreover, all the work to be done can be clearly seen. But no experience will enable a man to guess at the cost of work shown by plans and specifications with any reasonable certainty. If you have not the time to measure up the plans and read the specifications thoroughly—not only the painter's, but the carpenter's, plumber's, stair builder's, roofer's, plasterer's, in fact every other mechanic's branch—you had better let the job alone and decline to estimate. Otherwise you are merely gambling on the chances of a profit. It is because so many men do not know how to figure from plans, or do not take the time and trouble to figure accurately and carefully, that estimates vary so widely.

—1287—

Estimating on Painting a House.

A painter asked how to figure on painting the woodwork of the exterior of a brick house. Also on the woodwork in the interior of dwellings.

In estimating the outside of a brick house, measure with a tape line the cornice, as though it were plain surface, then consider the moldings, brackets, etc., doubling or trebling the real width, as for instance, if the cornice is, say 80 feet in length and has a breadth of 15 inches, this, if plain work, would give 100 square feet—11 $\frac{1}{9}$ square yards. In most cases, this figure should be doubled, making 22 $\frac{2}{9}$ square yards. Door frames and doors, window frames and sash are figured as full panels, no allowance being made for the lights in sash, and if these are to be trimmed in colors, the measurement is doubled. Say for instance, if there are two doors and twenty windows, each door and frame 32 square feet and each window frame and sash 22 square feet, giving a total of 504 square feet—

56 square yards, it is necessary to figure on 112 yards, because this work will take fully twice the time that would be spent on plain, level surface, such as the body of a frame dwelling. The same applies to blinds and lattice work, as well as porch rails. For interior work, take the measurement of doors, window sash, door and window casings, baseboards, stairways, closets, in fact, all the exposed woodwork to be painted or otherwise finished. Multiply the length by the width in inches, divide the product by 144, which will give you the number of square feet, and if you would rather estimate by the yard, divide the number of feet by 9, which will give the number of square yards. Here, too, it will require good judgment as to how much should be added for difficult work, moldings, carved work, recesses, etc.

We assume that you know from experience the material required per square yard and the time required to apply the same. It would be idle for us to give you figures in that direction.

—1288—

Estimating on Painting Cotton Duck Canvas.

Our advice was asked on the cost of applying two coats of pure white lead, thinned with raw linseed oil, first coat to be applied as heavy as can be put on with a brush, the canvas to be dampened; second coat of ordinary consistence for painting.

It would be best policy for you to mix a small quantity of the brand of white lead referred to in oil to proper consistency for first coating, dampen, say a yard of the 10-ounce canvas you speak of, place the pot containing the lead and oil, together with a large wall brush, such as you would use in actual work on canvas, on a scale, then paint one yard and weigh the pot, paint and brush again, thus determining how much of the paint is required for the first coat per square yard, or 9 feet of canvas. If you cannot wait for this coat to dry before estimating on the quantity required for the second coat, you can estimate it by your experience on other work, as for instance, on the application of a coat of lead and oil over old painted surface.

We would roughly estimate that to be of proper consistency, the paint for first coat would have to be composed of the following—One hundred pounds pure white lead, mixed with $3\frac{3}{4}$ gallons raw linseed oil, producing $6\frac{1}{2}$ gallons of paint, covering 250 square feet at most per gallon. For second coat would figure on 100 pounds pure lead, mixed with 5 gallons raw linseed oil, producing $8\frac{3}{4}$ gallons of paint, covering at least 400 feet per gallon.

PAINTING BOATS.

—1289—

Boat Painting.

Enough attention cannot be paid to the smoothness of the hulls of pleasure and racing boats, no matter what the propelling power may be.

A little extra care in preparing the hull below the water line will go far toward bringing about the result desired—an increase of speed. As this work lies all along the line of repainting or refinishing, the first step is to get the bottom as dry as possible, then to scrape and sandpaper the old paint or finish until a perfectly smooth surface is obtained. For quick work, whether done in paint or natural finish, a thin coat of grain alcohol shellac varnish should be applied, to be followed when dry in the case of paint with a ground coat of pure lead in oil, thinned with equal parts of raw linseed oil, turps and coach japan. This coat, after drying hard, should be smoothed sandpapered and the next coat, if the job is to be in white, should be equal parts white lead and zinc white, thinned with two parts oil, one part turps, and one part coach japan. If a tint is desired, this white need only have the requisite coloring matter added.

For the third and last coat in white or tint, the lead may be reduced to one-third and the zinc white increased to two-thirds, as such a paint will not be so liable to be softened by constant contact with water, be it salt or fresh. In thinning the lead and zinc for use for this coat, oil should be omitted, the paste broken up to a thin semi-paste with turpentine and enough of a first-class spar varnish added to make it spread well. This mode of painting at first glance may appear rather expensive, but results will show its superiority to ordinary work. For a high-class finish in the natural, the shellac varnish coat is followed with two or even three coats of first-grade spar varnish, but if time does not permit of applying spar varnish throughout, one or two coats of hard drying, rubbing varnish.

—1290—

Painting Boats Used in Fresh Water.

For a new boat we suggest the following method:—Sandpaper well the surface and give a coat of pure white lead in oil, thinned with 3 parts raw oil, 2 parts turpentine and 1 part liquid drier for a clear white job. If it is to be finished in a tint, add color enough to produce effect desired, even for the first coat. If the exterior is to be green, have this first coat of prime lead color by tinting the white lead with lampblack in oil. Apply the paint with full brush and rub out well. Give several days to harden before applying second coat; if possible, wait for a whole week. For second coat, if the job is to be white, mix equal parts white lead in oil and zinc white in oil, and if to be tinted add the required color in oil, thin with turpentine and small portion of liquid drier, so that it will dry nearly flat. Allow to harden for a few days, then smooth with sandpaper for a fine job.

For finish, if the job is to be in white, thin a good grade zinc white in oil with a first-class exterior or spar varnish of fairly pale color to free flowing consistency and for tints, add to this the required color before adding the varnish, but do not flow on; brush on uniformly and not too heavy. If the hull of the boat is to be green or any other solid color, thin the oil color for second coat also, so that it will dry flat and add spar varnish for the finishing coat.

If the boat has been painted before it is best to scrape all of the loose paint off, and if some of the old paint is still in good condition only the bare surface, such as the keel, requires a first coat, while the other parts may be sandpapered and the whole surface given a coat that dries with eggshell gloss, after which a finish like the one suggested for new boats may be given. But in order to obtain good wear avoid inferior varnish in the finish and impure oil and impure turps in the groundwork.

—1291—

Painting Boats.

You cannot expect two parts white lead and one part zinc white, in equal parts of boiled oil and turpentine, to keep from becoming soft, when immersed in water for any length of time. This white paint mixture is a first-class one for the hull above the water line, but for the keel and part below the water line you need something more impervious to water than boiled linseed oil and turpentine will make it. For that part of the boat we would suggest that you thin your white lead and zinc mixture to a thick creamy paste with turpentine and then add enough good spar varnish to produce a glossy white of good spreading consistency.

As to the use of graphite, we do not see why you rub dry graphite over a tacky coat of spar varnish, as it is bound to make a mess when in the water for a while. Why not mix the dry graphite with one part of coach japan, two parts of spar varnish and one part turpentine? Of course, this will not polish like dry graphite, but if such a polish is required it can be given by mixing the dry powder with beef tallow and applying it as a final coat, which will shed water and increase the speed of the craft. If the graphite and tallow alone has not sufficient binding property, a trifle of quick drying varnish added will help it along. Such a mixture can be applied with a brush and smoothed down to a polish with cotton waste. For the bottom of launches to be painted maroon color, use a good Tuscan red, ground in oil, thin with a little turpentine, add some coach japan and reduce with spar varnish to brushing consistency. If they are to be green, select chrome green, bronze green or bottle green of the desired color ground in oil and treat it in the same manner as the Tuscan red for the maroon color.

—1292—

Best Putty for Boats Below the Water Line.

What material makes the best putty for use on boats below the water line, one that does not swell?

The best putty for the purpose is made as follows:—Four pounds burnt umber is boiled in seven and one-half pounds linseed oil for two hours, then two ounces of yellow beeswax is stirred in. When dissolved take from fire and allow to become lukewarm, then stir in and mix thoroughly with it eleven pounds powdered chalk and two pounds powdered white lead. Knead this mixture, using more chalk or whiting until of the right consistency. Keep in water to avoid its getting hard.

—1293—

Copper Bronze Paint for Bottoms for Boats in Fresh Water.

The specifications for painting two boats calls for the use of a copper paint on their bottoms. The paint is to be of such a nature that it will not be affected by the water and that river moss will not adhere to the bottoms. The painter has a sample of the paint specified, but is unable to find it in the market. The sample is similar to copper bronze and its odor is similar to that of banana bronzing liquid; has good body; dries tough and elastic, almost like a sheet of copper. Has seen the bottoms of boats painted with it which were in the water a whole season, coming out as solid and as clean as new, while the bottoms of boats painted with ordinary oil paints looked bad, were full of scum and moss, with water bugs adhering to them.

While we do not know the origin or composition of this copper bronze paint you refer to or the manufacturer thereof, we would say that from your description it is copper bronze powder, thoroughly mixed with a celluloid spirit varnish and not with an ordinary banana bronzing liquid. You can procure, no doubt, from a wholesale drug house a sample of such varnish or lacquer and mix it with a good copper bronze, and determine by a trial, in a small way, whether such mixture will match the sample in your possession, before you go to the ex-

pense of purchasing a sufficient quantity. If you succeed we would caution you to mix only sufficient for one coat at a time, as you will find it necessary to make more than one application. Such a paint requires rapid working, and on second coat must be flowed on, otherwise it may raise or lift the first coat.

—1294—

Green and Red Copper Paint for Ships' Bottoms.

We can give a general idea of the composition of the majority of copper paints for use on the bottoms of wooden craft. The principal ingredients are oxide of copper with some mineral pigments, ground in pine tar and thinned with such solvents as resin spirits, benzol or benzine. This produces a brown paint and in order to change it to red and green, coloring material is added, such as fine red oxide of iron for the red and chrome green for the green. The idea is that the action of sea water will gradually disintegrate the paint and free the copper salts, which are to destroy the life of sea growth (barnacles, etc.), while the friction caused by the running of the craft is supposed to remove the particles of the disintegrated paint and with it the growth, thus keeping the bottoms clean.

—1295—

Durable White Enamel for Yacht Painting.

A formula was wanted for making a durable white enamel for pleasure yachts that run on the inland lakes and never come into contact with salt water.

Unless you have a good paint mill at your command, we would advise you not to attempt to prepare an enamel from start to finish. If you are so equipped, however, you had best purchase some good, fine white lead and best grade of French zinc white, and mix equal parts by weight of those with four parts of palest rubbing varnish and one part turpentine to a paste of medium consistency, which should consist of about thirty-seven and one-half parts each of lead and zinc, twenty parts varnish, and five parts turpentine. Run this through the paint mill until fine, but avoid getting the mill too hot. Thin this paste with the palest durable enamel varnish it is possible to obtain. Such an enamel should set, dust free, in about six hours, and be hard in twenty-four hours. If quicker drying than that, it will not stand exposure for a season. You can also omit the white lead and use zinc white only, but on grinding the paste you will require more thinners.

—1296—

Bright Red for Boats to Stand Salt Water.

The best material with which to paint boats a very bright red that will stand three months in salt water was desired.

There are now some very durable bright reds on the market, known under the collective name Para red, generally sold under such brands as unfading, non-fading, permanent red or vermillion. Any of these, when applied flat over an appropriate ground, made from cheaper material and coated over with good spar varnish, which is known to stand salt water, will serve the purpose. We cannot recommend any particular brand.

—1297—

Painting a New Canvas Canoe.

To paint a canvas canoe, which is to be filled and made smooth, as is the custom with canoes constructed of canvas stretched on wood:—

The following method is in use in the British navy yards and has given excellent results:—Eight pounds of best yellow ocher ground in boiled linseed oil are mixed with one pound of lampblack in boiled oil. This makes a paint of

greenish black color, to which is added one ounce of yellow soap, dissolved in one-half pint of boiling water while still hot. Applied to the canvas with a brush as stiff as can be done with a good four-inch wall brush, it will dry in about three days, when another coat of the paint, this time without the addition of soap and made thinner by adding more boiled oil, is applied, which dries free of tack in another three days. This makes the canvas impervious to water and prevents it from cracking or rotting, and the canoe may be finished with one or more coats of any desired oil paint.

The first coat supplies the waterproofing feature, the second coat the filling. The idea of using ocher and lampblack, instead of other filling material with white lead, must be looked for in the light specific gravity of the lampblack and ocher and in the filling properties of the latter, the lampblack and oil supplying the required elasticity. It is needless to say that the finer the black and ocher are ground the smoother the surface produced.

Should this method be unsuitable on account of color, we would suggest a mixture of 7 pounds of white lead in oil (keg lead), and 3 pounds of dry whiting, thinned to a semi-paste with boiled linseed oil, adding 1 ounce of yellow soap, dissolved in $\frac{1}{2}$ pint of water, applying it to the canvas with a brush as thickly as possible, then, before the material dries or sets, go over it with a large spatula, removing the excess of paint, so as to leave the filling in the canvas and yet have the surface smooth. When dry, apply another coat of the same mixture, somewhat thinner, and when this has hardened smooth down with sandpaper and finish in any color desired with good oil paint.

—1298—

Varnish for Boats That Will Not Turn White.

A formula was wanted for a varnish that will not turn white when applied to boats that remain in fresh water for a long time.

The only varnish that will keep from turning white under the conditions named is a preparation made from fossil gum rosin, such as true amber, but we do not see how any one but a thoroughly experienced varnish maker, equipped with the proper apparatus, can produce it on account of the very high temperature required for fusing amber. Fifty parts by weight of genuine amber rosin are fused with seventy-five parts by weight of linseed oil and sixteen parts by weight of litharge and ninety-two parts by weight of red lead. The varnish, after having been thoroughly cooked, until all the lead compounds have been taken up, is allowed to cool and settle until clear. When used in this state it will resist the action even of boiling water, and when thinned to the consistency of ordinary varnish it will upon application to wood resist the action of fresh water for a long time and will not turn white.

—1299—

Repainting Canoes from Which the Paint Is Abrased.

The best way to obtain good results is to remove the paint still remaining clean to the wood, either by burning off or by applying the following:—Slake 15 pounds of quick stone lime in water, and when fully slaked add 5 pounds of American pearlash, making the mixture of the consistency of semi-paste paint. Lay this fairly thick on the paint, let it remain until the old paint is softened clean down to the wood and scrape off, then wash with water and vinegar, equal parts, and allow the surface to dry thoroughly before attempting to repaint. Sandpaper the places where the grain of the wood may have been raised by the action of the lime and pearlash mixture.

In repainting do not hold your priming or first coat too oily, but temper it to suit the nature of the wood, or, best, use equal parts raw linseed oil and turpentine, and if any puttying is to be done, do it after the priming has dried and use good linseed oil, lead and whiting putty. As less than three coats will not make a good job, would suggest that the second coat be held so as to dry with

no higher than eggshell gloss, and if high grade of work is desired, regardless of cost, would recommend the adding of a first-class spar varnish to the oil paint for third coat. Remember that too liberal a dose of oil in paint for boats is liable to cause peeling or blistering, and mix your paint for the various coats accordingly

—1300—

Best Paint for a Light Canoe Exterior.

That depends very much on the color desired. If it is to be a clear white or a light tint, we should say give it a coat of white lead; or white lead with coloring matter to suit, if a tint is wanted. Thin the lead with two parts raw oil and one part turpentine, with only enough drier to make this coat dry hard in twenty-four hours. Have your second coat made of equal parts of pure lead and pure zinc white, cut with a little drier and turpentine and thin with good spar varnish. If chrome green or olive green or similar color is desired, thin your color for first coat with equal parts of raw linseed oil and turpentine, adding enough drier to make it set up over night and to be hard enough to receive the second coat in from thirty-six to forty-eight hours. Thin the color for second or finishing coat with a good japan or liquid drier and turpentine, and add enough of good spar varnish to produce good gloss. This applies to all solid colors, such as chrome yellows, Indian reds, Tuscan reds, blacks, etc. When the job is in a hurry and quick work paramount to durability, a good hard drying, rubbing varnish may be used in place of spar varnish.

—1301—

Paint for Galvanized Steel Hull of Steam Yacht, Plying in Acidulated Water.

Would like to know best method to pursue in painting the galvanized steel hull of a steam yacht plying on Ohio River, where the water, when low, is contaminated with sulphuric acid to some extent.

I was called on to paint the hull of this yacht a short time ago. Have given the hull one coat of white lead mixed with turps and a good exterior varnish so far, but in the spring it is to receive another coat.

If the water is, as you say, contaminated strongly with sulphuric acid, if only to the extent of a small fraction of one per cent., your coat of white lead (if it is really pure basic lead carbonate) will not be in condition to receive another coat of paint in the spring, if it is in the water now. Pure white lead, no matter what vehicle it is mixed with, will not stand the action of even very weak acids, and the length of time simply depends on the vehicle and the strength of the acidulated water. When mixed or thinned with a good, hard gum varnish, it will resist the attack of the water much longer than it would when thinned with oil, turps and drier only. What you do require in this case is a sort of white enamel, with zinc oxide as pigment and hard gum varnish for the vehicle, the whole to be cut with turpentine for easy spreading. If the old paint is still firm, we would suggest that you apply two coats of such enamel, the first coat to contain less varnish and more turps than the finishing coat, and the latter not to be applied until the first coat is hard throughout. If the hull is bare to the metal, then we should recommend a first coat of priming, which may be made of pure red lead and oxide of iron red, three parts of the former to one part of the latter, by weight, mixed from the dry material with equal parts raw linseed oil and turpentine without driers, to be applied within twenty-four hours after mixing. Two coats of white will cover over this, if a trifle of lampblack is added to the first coat of white, just enough to make a very faint lead colored tint.

—1302—

Painting the Hull of a Yacht Built of Cypress, to Stand Sewage Water.

Best sort of paint to stand Mississippi River water, that is contaminated with sewage and carries sand at certain periods.

Prime with one coat of pure lead in oil, tinted a dark lead color with lamp-black in oil, thinning with pure raw linseed oil and turpentine, three parts oil and one part turpentine, adding a small portion of drying japan only. This prime should be of medium stoutness, but brushed out well over the surface with full bristle brushes. If the finish of the hull is to be green, and first cost is not to be considered, we should suggest a paint made from true chrome green (the oxide of chromium) and a small portion of white lead, same to be thinned with raw linseed oil, drying japan and spar varnish. Two coats of this to be applied over the lead priming, the first reduced with some turps, to subdue gloss, the second or last coat to be in full gloss. The green and white lead to be ground in oil, the thinness to consist of five-eighths linseed oil, one-eighth driers and one-quarter spar varnish. The latter to be made from kauri gum of approved quality. If you wish to have the finish in red, pure Indian red or a good brand of Tuscan red, thinned as in the case of the green and similarly applied, would serve the purpose, but not less than two coats over the priming is necessary. For black, would suggest a good brand of drop black in oil thinned with four parts kettle boiled linseed oil, one part japan drier and three parts of best spar varnish. As in the cases of the green and red, cut the black with turpentine for first coat in order to cut gloss, which will make it dry hard and thoroughly. The addition of spar varnish is to insure the shedding of bilge or sewage water.

—1303—

Paint for Gasoline Launch Used in Salt Water.

Formulas for painting a gasoline launch that is used on the Great Salt Lake for inspecting trestles. The water is 14 per cent. salt. Want to paint the launch, both inside and outside.

You do not state what color you wish to have the paint for the exterior of the launch, but probably you do not care, so long as you have a paint to protect the metal. Now we believe that you require something of the nature of a brine-proof paint similar to that used for protecting the iron work on refrigerator cars, and if such is the case, the master car painter having charge of the painting of the equipment of your company would be in the best position to furnish the right material. It is against our practice to furnish the names of parties supplying materials for special purposes, and as to formulas, we can only give you our individual opinions, without giving any guarantee as to results. We should suggest as the best paint to resist salt water of the strength you mention to be composed of 75 per cent., by weight, of zinc oxide and 25 per cent., by weight, of silica or silex in the pigment, the thinners or vehicle to be 65 per cent. boiled linseed oil, 20 to 25 per cent. best spar varnish (hard gum varnish), balance turpentine and drier. To be tinted to any color desired with the necessary oil color. This for the finishing coat. The ground coat or coats to be mixed equal pure white lead and zinc oxide in oil, thinned with raw linseed oil and driers only, but each coat must be dry and as hard as possible before another is applied.

For the inside of the launch, which must be resistant to machinery oil and to the wear incident to its service, we should suggest a first coat of lead and zinc combined, applied so as to dry nearly flat, then a coat of zinc oxide in oil, thinned equal parts linseed oil and turps, and a finishing coat of zinc oxide in spar varnish, tinted to throw it off the clear white.

—1304—

Paint for Boats and Launch Bottoms.

Required to know the best paint to use for boats and launches below the water line for fresh water.

For wooden bottoms as a first coat or priming, a paint composed of the pigment desired, ground in raw linseed oil, thinned with a mixture of six parts raw linseed oil, three parts pure turpentine and one part good turpentine japan by measure. This priming coat to dry hard before another coat is applied, then all defects puttied up with pure linseed oil and whiting putty, to which 10 per cent. by weight of pure lead has been added. The putty may be colored to match the priming coat with dry color or ground in oil, but if much of the latter is used, some dry whiting may be required to stiffen up the putty. The best pigment for the first coat is three parts pure white lead in oil and one part zinc white in oil, tinted to light lead color with lampblack in oil and thinned, as suggested above. Red or green will cover well over this lead color, so will maroon or brown, but white or delicate shades are not to be recommended below the water line. For red, oxide iron ground fine in oil; for green, a medium shade of chrome green ground in oil; for maroon, Indian red, drak, ground in oil; for brown, red oxide of iron in oil and burnt Turkey umber in oil in the proper proportion are most suitable for the purpose. If you would have a first-class job, that will be a credit to you, have the priming and puttying well sandpapered to a smooth surface, then apply a first coat of either of the colors referred to, thinning the oil color, as you purchase it in the paste form, with three parts raw linseed oil, four parts turpentine and one part turpentine japan. When this coat is dry and hard, apply a finishing coat of the same color ground in oil, thinned with enough turpentine to produce a semi-paste, which reduce to brushing consistency with a water resisting spar varnish, that has been found satisfactory in previous trials.

One of the chief aids to success in painting boats below the water line is to use strong colors, so that the paint will cover, even if used rather thin. Medium thin coats are necessary to avoid peeling.

—1305—

Painting the Bottom of Canoes or Boats with Antifouling Paint.

We believe that it is a fallacy to use the so-called copper paint for bottoms of boats, running in river or inland lake waters only, and rather a detriment to good wear and swift movement than otherwise. Copper paint for ship bottoms is to serve a special purpose in seawater only; that is to keep off or eliminate barnacles and seagrowths from below the water line of the craft so that speed will not be impeded. These antifouling preparations, in order to be effective, must not only be composed of copper or some other germicide, but must be free from linseed or other vegetable oils that promote seagrowth or the adhesion of slime, etc., in stagnant waters. This, of course, is not the case in river or lake waters, and the best material for painting boats below the waterline is a high grade paint composed of fine pigment, such as chemically pure chrome green or zinc white or basic sulphate of lead, tinted to the desired shade with inert colors, ground in oil, thinned to brushing consistency with boiled linseed oil, best coach japan, a moderate portion of pure spirits of turpentine and enough waterproof hard gum varnish to give a finish of good luster, that will not permit adhesion of any matter to impede the speed of the boat. While shellac varnish is not waterproof, it is often used on bottoms of racing yachts, temporarily, for a short race, to give speed.

BLACKBOARD PAINTING.

—1306—

Blackboards on New Plaster and Renovating Old Boards.

There are two methods for preparing the plastered wall for blackboards, one may be described as the quick, the other as the slow way. In the first the space to be occupied by the blackboard is smoothed with sandpaper, dusted and then given one or two coats of good glue size, according to the hardness of the plaster. When the size is dry and hard, it is rubbed down with fine sandpaper, and in the meantime moisten lampblack with alcohol, rubbing it into a paste and stir into it enough shellac varnish to make it work freely under the brush. Apply at least one coat of this over the glue size as evenly as possible and when dry rub down with pumice and water. Then give 2 coats of the following:—Dissolve orange or brown shellac, $\frac{1}{2}$ pound in 2 quarts of alcohol and stir the solution into a mixture of 2 ounces dry lampblack, 2 ounces dry ultramarine blue, 4 ounces finest washed emery flour and 6 ounces flour of pumice. When this is hard, rub again with pumice and water. This coating may be written on with soapstone pencils, as well as with chalk. Every coat must be applied rapidly in order to prevent laps. When a board of this character is worn it may be renovated by cleaning it down with vinegar to remove grease, etc., and recoating with above mixture.

The slow but cheaper method is to smooth sandpaper the surface and giving a first coat of dark lead color, prepared from white lead and lampblack in oil, thinning with raw linseed oil and drier, adding enough turpentine or benzine to aid penetration. When dry, give a second coat of lampblack, to which some white lead is added, but thin with equal parts linseed oil and turps, with enough good japan to hasten drying. If there are any brush marks visible, let it become hard enough and smooth sandpaper the surface. Now apply a coat of dropblack in japan, thinned with turps only, to produce a dead flat surface. For the finish apply a similar coat, but add to one-half pint of the thinned paint one tablespoonful of good rubbing varnish, and apply quickly and evenly with a good flat varnish brush, so as to prevent laps. This surface, however, may be written on only with soft crayon chalk. This last coat will also serve for renewing old boards after they are well and thoroughly cleaned.

—1307—

Painting Old and New Blackboards of Wood and on Plastered Walls.

To renew old blackboards, whether on wood or plaster, first wash down the surface with strong vinegar in order to remove all grease and dirt, then sponge off with clear water. When dry, touch up the worn spots with lampblack that is ground or mixed in japan and thinned with turpentine, or, if required, go over the whole surface with this mixture. Upon this apply the liquid slating hereinafter mentioned. To prepare a portion of a plastered wall to serve as a blackboard, go over the surface with sandpaper, then give one coat of lampblack ground in oil and thinned with boiled oil and turpentine japan. Follow, when dry, with a second coat of lampblack in oil, thinned with turps and japan only, equal portions. Finish with liquid slating, which is to be had in ready for use form, or prepare it yourself as follows:—Moisten 4 ounces dry lampblack with alcohol and rub it out with a spatula, soaps to be free from lumps, then add, while stirring, 1 quart of orange shellac varnish and 3 ounces each of flour of pumice and pulverized rotten stone, sifting it through a fine strainer. If too stout to flow freely add more alcohol. Apply quickly over the prepared wall or over the old surface referred to with a flat brush, and avoid laps, giving as many as three coats the same day. After standing a day or so go over the surface with hair or moss, dipped in a little pumice and water, and rub it smooth. Use this slating for new wooden blackboards from the raw wood to the finish. Apply as many coats as are needed to give a good smooth surface.

—1308—

Blackboard Paint.

On a plastered wall give a coat of glue size first, rub down lightly with fine sandpaper to knock off fine grains of plaster. On wood omit the glue size. On either surface apply two coats of black shellac varnish, which is prepared by moistening lampblack with grain alcohol, making a thin paste, of which enough is stirred into orange shellac varnish to color it. When the second coat is dry, sandpaper light or rub or moss down with pumice and water. Then mix the following:—One-half pound orange or brown gum shellac dissolved in 2 quarts grain alcohol, $1\frac{1}{2}$ ounces dry lampblack, $1\frac{1}{2}$ ounces ultramarine blue, 4 ounces washed flour of emery and 6 ounces flour of pumice. Stir well, and if too stout to work freely, add more alcohol. Remember that at least two coats of this last coating are required to make a good surface and that it must be applied rapidly to prevent laps. This can be written on with soft slate pencils as well as with chalk.

—1309—

Liquid Slating or Blackboard Wash.

By liquid slating we understand a wash for renewing or renovating blackboards that have been in constant use and need freshening up. It is made by intimately mixing $1\frac{1}{2}$ ounces of lampblack, 2 ounces ultramarine blue, 4 ounces powdered rotten stone and 6 ounces pumice flour with a solution of 8 ounces orange gum shellac in 5 pints 95 per cent. grain alcohol. It is best to moisten the lampblack and ultramarine blue with alcohol before they are added to the shellac and put the whole mixture through a wire sieve of 120 meshes to the inch before using. Apply quickly with a varnish brush, a flat, wide brush is best, to the previously cleaned board.

—1310—

Blackboard Painting.

One of the latest methods is that given by C. H. Bergmann, principal of a Charleston, S. C., school, and published several years ago in the *Scientific American*. He claims that it makes a velvety surface that will never look gray, as the case with the boards painted with lampblack. His formula consists of Prussian blue and very dark chrome green, equal parts, with sufficient of equal parts of gilder's sizing and alcohol. The dry powders are mixed with enough of the liquid to produce a paint of the consistency of cream which is applied quickly with a large stiff brush. After an hour or so, a second coat is given, and after 24 hours the surface is mossed or haired down with pumice and water.

Before the mixture referred to is applied, the surface should be primed with ordinary hard drying paint.

Another good blackboard paint may be made by mixing a half pound flour of pumice, well sifted, a half pound rotten stone and a half pound best lampblack with enough alcohol to make a thick paste, which must be well rubbed out to free it from lumps. Add to this enough thin shellac varnish, a little at a time, constantly stirring the mixture, to make one gallon of paint and strain through a fine sieve or paint strainer. Keep the paint well stirred and apply quickly with a flat brush. Let the first coat dry hard before applying the next and see that on applying the second coat you do not rub up the first. When this paint is applied to a plastered wall, the latter should be sandpapered and dusted off and a hot glue size, consisting of one pound of glue to a gallon of water, colored with a little lampblack, applied before the blackboard paint is put on. If new wood, it should be primed with a coat of lead and oil paint, colored with lampblack. If the finish is smooth enough, or too glossy, moss or hair down with flour of pumice and water. One gallon of this paint is sufficient for 500 square feet of blackboard surface, two coats.

—1311—

Ruling Lines on Blackboards.

Oil colors, when thinned with japan and turpentine, will not run in striping, but japan colors should have some boiled oil and only little turps for thinners, if they are used for this purpose. To make the lines stand the continuous friction from marking with chalk and the washing with sponge, a coat of rubbing or flatting varnish should be given, and this rubbed down with pumice and water, because chalk will not mark or hold well on glossy surfaces.

—1312—

How to Prepare and Apply Blackboard Slating.

To make a good blackboard, the surface must be prepared in the proper way. On a plastered wall give a coat of glue size first, rub this down lightly with fine sandpaper, then moisten lampblack with alcohol, making a paste and stir enough of this into shellac varnish to give body. Apply this over the glue size evenly, and when hard rub it with pumice and water. On wood, omit the glue size, but give two coats of the shellac and lampblack mixture, and sandpaper lightly or moss down with pumice and water. Then give two coats of the following:—Dissolve $\frac{1}{2}$ pound brown shellac in 2 quarts alcohol, add $1\frac{1}{2}$ ounces of dry lampblack, $1\frac{1}{2}$ ounces ultramarine blue, 4 ounces flour of emery and 6 ounces of flour of pumice. If too stout to work freely, thin with alcohol. Such a blackboard may be written on with soapstone pencils as well as chalk. Remember that the preparation must be applied rapidly to prevent laps.

—1313—

Cheap Blackboard Slating for Plastered Walls.

The cheapest way to make a blackboard on a plastered wall is to smooth sandpaper the surface first, then give a coat of lampblack ground in oil, thinned with boiled oil and liquid drier; when dry give a second coat of lampblack in oil, thinned with equal parts boiled oil and turpentine, to which some drier is added. When this is thoroughly dry, give a coat of drop black in japan, thinned with turpentine only in order to make a dead flat surface. In order to have this last coat bind properly, a tablespoonful of coach varnish should be added to one pint of the thinned paint, which should be applied quickly and evenly with a good, wide, flat varnish brush, so that no laps are visible.

Another cheap paint for renewing old blackboards may be made by mixing silicate of soda with its own bulk of soft water and adding to this enough lampblack that has been ground in water to color this solution.

The blackboard to be renewed must, however, be thoroughly cleansed before applying the paint.

—1314—

Paint for Blackboards Which Cannot Be Marred or Scratched by Chalk.

The best blackboard paint is made by moistening four ounces dry lampblack with alcohol, rubbing it out with a spatula, gradually adding one quart of shellac varnish and stirring into this three ounces flour of pumice and three ounces finely pulverized rotten stone; then straining through a fine sieve or strainer to break up any lumps that may have formed. This is applied quickly to the bare wood, so that no laps are formed, and in one hour's time a second coat may be applied, which, after a day or so, may be haired or mossed. The quantity mentioned should cover five boards four feet square two coats. A cheaper method is to mix four parts, by weight, of lampblack in japan with one part, by weight,

of ultramarine blue, also ground in japan, and one part by weight of washed flour of emery. Add to this one-half part, by weight, of quick-rubbing varnish as a binder, and thin with turpentine sufficiently to flow on and not show brush marks. Three coats of this should be given, and when dry and hard the finishing coat haired down. A green paint for blackboards has lately come into vogue, and it is claimed that this is more soothing to the eyes than the gray tone given to lampblack. A formula for such paint has been communicated to the Scientific American by Mr. G. H. Bergmann, principal of a school at Charleston, S. C., who claims perfection for it. It is as follows:—Equal parts of Prussian blue and chrome green in fine powder are mixed with gilders' sizing and alcohol, equal parts, sufficient to produce a paint of creamy consistency. Apply with a large, stiff brush quickly and give a second coat after an hour or two. After twenty-four or forty-eight hours it may be smoothed with hair cloth and fine pumice.

—1315—

Blackboard Paint or Liquid Slating.

For a quick job, dissolve ten ounces orange gum shellac in one-half gallon alcohol. Add, while briskly stirring, two ounces of high-grade calcined lampblack, three ounces of ultramarine blue of fine grade, six ounces powdered rotten stone, eight ounces flour of pumice and keep on beating until the mixture is free from lumps. Run through a fine strainer and apply quickly with a flat varnish brush. Several coats are usually required. Keep the paint well covered when not in use. Another liquid slating, but rather slow in drying, is mixed as follows:—

One pound of drop black in oil, one-quarter pound ultramarine blue in oil and one pound of washed emery flour are well beaten together with one-half gallon coach japan and thinned with one pint of turpentine, then passed through a strainer and applied as above. In place of the emery one pound flour pumice may be used.

—1316—

Removing Paint from Slate Blackboards.

To remove paint from slate used for blackboards pumice stone and water had been used, but not with good success.

It is just possible that the slate was coated with the old-fashioned process of coating blackboards, that is, with lampblack in spirit varnish, when four or five coats were given in succession, each coat being spirited off before applying the next. This process is, or was, similar to the baking process and forms a very hard surface that requires several coats of a neutral paint and varnish remover to budge, while the old-fashioned alkaline removers would scarcely touch it because of the baked gum. If you do not care to take the paint off entirely by using one of the quick paint and varnish removers but merely wish to get the surface down to a uniform level for repainting, use first coarse emery cloth, then a finer grade, and finally rubbing brick (Schuhmacher's No. 3) and water to take out the scratches made by the emery cloth.

—1317—

Blackboard Slating on Plaster Walls.

Formula for making flat black on which to write with chalk.

In the first place apply a wall size of some kind to the space, then give one coat of lampblack in oil with a portion of turpentine added so as to dry with subdued gloss, then give a second coat of lampblack in oil thinned with turps only, and a little drier. This will be sufficient for the groundwork. If on sizing the space any little grains of sand should show, knock off with sandpaper when size has dried. To do very quick work omit the two coats of lampblack referred

to and use instead two coats of orange shellac to which has been added enough lampblack, wet up with alcohol to color it black. When the second coat is dry sandpaper lightly or rub with pumice and water. Then mix the following:— Dissolve one-half pound of orange gum shellac in two quarts alcohol and add $1\frac{1}{2}$ ounces dry lampblack, $1\frac{1}{2}$ ounces ultramarine blue, 6 ounces fine flour of pumice, and 4 ounces of rotten stone. Stir well and strain, and if too stout to work freely, add more alcohol. Remember two coats of this finish are necessary for a good surface, and it must be applied rapidly to prevent laps.

—1318—

Blackboard Slating for Quick Application.

The method referred to is rather obsolete, having been done away with some years ago by using natural slate in its place in most school rooms, especially in the Eastern section of the country. The best formula for the purpose we know of was to dissolve in one vessel 25 parts by weight of gum shellac and 7 parts by weight of gum sandarac in 25 parts by weight of alcohol. At the same time 3 parts of gutta percha by weight is shredded and in a separate vessel dissolved by moderate heat with 14 parts by weight of spirits of turpentine. After this last solution has cooled, add it to the first solution, stirring both well together. Then add to the mixture 500 parts washed emery flour and 12 parts lake black. When painting a new blackboard, apply one coat of this black to the wood, set the board in a vertical position at once and ignite the color at the lower edge. This will consume the alcohol, and another coat of paint can be applied, which is tested in the same manner, and in this way from 4 to 6 coats should be given, that will result in a dead black surface, free from glossy streaks and one that may be written on with either school crayon chalk or soap stone slate pencils. Old boards can be renewed in the same way after having been well cleaned.

—1319—

Blackboard Slating on Beaver Board.

Prime the board on both sides with white lead in oil and lampblack, using equal parts of linseed oil and turpentine for thinning, to keep the board from warping. Add some drier, if you do not care to wait too long for its drying. Then give one or more coats of flat black; that is, thin down drop black ground in japan with turpentine, adding just a trifle of coach varnish so as to give a very faint gloss, which will permit of wiping off the chalk marks with a sponge, as on a dead surface the chalk will not rub off readily.

PAINTS FOR SPECIAL PURPOSES.

—1320—

Painting Statuary in Soft Ivory Finish.

It was desired to obtain the most beautiful and natural effect of ivory imitation of statue work. Would like to have that waxy, transparent effect seen on the best work of that kind.

If old work, carefully clean the figures in the usual way with soapsuds and water, rinse and permit to dry. Then prepare your first coat of ivory, as you see fit, but have it dry flat. If this does not make a smooth solid job apply another coat. For the finishing coat prepare a special matt varnish of best quality (damar varnish does not dry hard enough) on a water bath, and when melted add 1 pint of pure spirits of turpentine. Strain and allow to cool before use. Tint up some French zinc ground in damar varnish to ivory color with a trifle of raw sienna and chrome yellow, or better still, use French yellow lake for tinting (which gives a cleaner tone), and thin with the matt varnish to the consistency of good flowing varnish, applying it carefully. This should dry with a faint egg-shell gloss, which when hard can be given a velvety finish by going over it with a piece of silk. If you have the statues already coated you can get similar result by simply applying the clear matt varnish referred to or you might try one of those flat varnishes offered by varnish makers in case it is too much trouble for you to prepare the matt varnish. At any rate this process will make a washable and very durable finish.

New plaster casts can be coated successfully in the following manner:—One ounce each of white soap and white beeswax are sliced fine and boiled in 2 quarts of soft water in an enameled vessel until both soap and wax are dissolved. The liquid is then strained and permitted to become quite cold, when it is applied to the figure with a soft brush. When dry it is gone over with a piece of soft silk.

—1321—

Painting Statuary in Soft Ivory Tints.

No. 1.—Boil some linseed oil with soda lye until a homogeneous mixture of soap is formed; this is accomplished by stirring the mixture for fifteen minutes, then separate the soap from the lye by adding common salt a little at a time, and collect the soap and dissolve it in soft water and in 1 part of sulphate of iron and 1 ounce of sulphate of zinc, both dissolved separately in water and mixed before adding to the soap solutions. Add sufficient of this mixture to the soap to precipitate all the soap, which is collected, and mix 9 ounces of it with 5½ ounces of white wax by heating together, and by boiling for 2 hours 12¾ ounces of litharge, 3½ pounds of raw linseed oil, and 1 pound of whiting. For use, warm the statuary to 100 degrees Fahrenheit, and apply the above compound to the hot figure by means of a brush. Then allow it to cool off and any parts that require to be polished can be rubbed lightly with a piece of flannel.

No. 2.—Slake 1 part of finely pulverized lime to a paste, then mix gypsum with lime water, and intimately mix both. From the compound thus prepared the figures are cast. When perfectly dry, they are painted with hot linseed oil, repeating the operation several times, then with linseed oil varnish, and finally with oil paint. Statues, etc., prepared in this way have been constantly exposed to the action of the weather for four years without suffering any change.

Yet another compound, by which casts can be prepared so they will retain no dust, and can be washed with lukewarm water, is by immersing them or throwing upon them a fine spray, a hot solution of soap prepared from stearic acid and soda lye in ten times its weight of hot water.

Prepare plaster of Paris casts with a compound of finely powdered mica and collodion, prepared as follows:—The mica, rendered perfectly white by boiling

with hydrochloric acid or calcining, is ground very fine, sifted and then mixed with dilute collodion to the consistency of oil paint, and applied with a soft brush. Casts coated in this way possess a silvery luster and can be washed without injury.

H. C. Standage.

—1322—

Moist or Water Colors and Inks.

How much gum arabic and water should be used to a size for water colors and what can be added to keep them fresh and from souring? Information was asked as to the poisonous nature of colored liquid inks.

There is no given rule as to the quantity of gum arabic and water to be used as the size of water colors, as each user has his own idea and makes his size conform to the free working of the color and the strength wanted. A trial in various proportions will give you the information. One ounce of gum arabic to one pint of water will give a size strong enough for water color washes. To keep from souring add a tablespoonful of spirits of wine to 1 pint of the solution. Fifteen drops of refined carbolic acid to 1 pint of the solution will also keep it from souring, but spirits of wine are less objectionable. As to the list of colored inks, would say that in the ordinary sense of the term only the vermilion is a direct poisonous substance, it being mercuric sulphide. Brick red, indigo blue, brown and black are practically non-poisonous, while carmine, scarlet, orange, yellow, blue, violet and green are more or less poisonous, if they should find their way into a person's stomach. They must not, however, be considered as being deadly poisonous, merely tending to give intestinal troubles. Vermilion, however, and probably scarlet, if a mixture of carmine and vermilion are strongly poisonous. If you are interested in this matter to any great extent it would be worth your while to ask the manufacturers direct, and no doubt they would volunteer the information.

—1323—

Quick Drying Paints for Machinery.

The black iron filler, used to surface iron castings, etc., which is applied in the same manner as glazing putty with a spatula or broad knife and smooth sandpapered, when dry, the best and cheapest way is for you to purchase it from a reputable manufacturer in the paste form, as we must assume that you have not the apparatus to make it in an economical way. However, if you wish to try the experiment, mix one-half gallon coach japan, one-half gallon rubbing varnish, one quart turpentine and stir into this liquid, 10 pounds each of bolted whiting and barytes and enough Muncy black filled to make a putty-like paste, which run through a mill. If any other than black is desired, substitute mineral brown, Venetian-red, or yellow ocher, as the case may be. For white, use dry white lead, as zinc oxide would make the filler most too brittle.

—1324—

Imitation of Gold Color and Aluminum Bronze Finish on Iron.

How can an imitation of gold color be made that is to serve for coating ornaments on an iron building front in combinatin with aluminum bronze? Also should the latter be mixed with the size or applied dry on the size, when the latter has set, and should the bronze be finished with varnish as well as the imitation gold color? Could a painter guarantee the job for five years, it being an eastern and southern exposure to direct sunlight?

We would advise you to make your imitation of gold color for that work by imitation 60 parts by weight of white lead, 33 parts by weight of pure lemon chrome yellow, 5 parts deep English vermilion, and 2 parts burnt sienna, all ground in oil and thin with pure spirits of turpentine. When dry and hard you can smooth sandpaper the work and finish it with varnish. This will be an

imitation of rich gold. To make a pale shade of gold, omit the English vermilion and replace it with a little extra light chrome green. The plan of applying two coats of lead in oil and turps over the old Brewster green paint is all very well, so far as it goes, but you must make sure that the old paint is still solid and that it is well cleaned or your two coats of paint will not cover. The first coat on the new work where you intend to apply three coats should not be flat, but must contain oil enough to bind it well to the wood. The next coat, on both the old and new work, should be mixed or thinned with one part linseed oil and two parts turps, and not rubbed as you suggest, but the last coat should have no oil added, but consist only of the lead and colors in oil, driers and turpentine, so that it may be sandpapered smoothly before varnishing. Rubbing down each coat on work subjected to exposure, as is the case here, we consider unwise, especially where there are only so few coats of paint, and when the paint is made up without varnish. If any rubbing must be done, the last coat of paint is to be sandpapered and given a coat of first class exterior rubbing varnish, which, when dry and hard, is "mossed" or "haired" down, preparatory to applying the finishing varnish.

As to the aluminum bronze, we would say it will wear best if mixed with the liquid and applied wet. If a high grade of bronzing liquid like collodion lacquer is used, a coat of varnish is hardly necessary, but if ordinary bronzing liquid made from copal varnish is employed, one or more coats of first class pale exterior varnish are required. We should not advise you to give a guarantee for five years, because even with the very best material it is doubtful whether the job will hold out that length of time.

—1325—

Acid Proof Coatings for Laboratory Tables.

When black is not objectionable, a mixture of liquid coal tar and quick drying asphaltum varnish is the simplest preparation for the purpose, resisting acids to a remarkable degree. A more expensive coating is made by saturating lampblack with alcohol and permitting to stand over night all covered, mixing with shellac varnish to the proper consistency for application. If black is undesirable, an acid-resisting paint may be made by using finely powdered yellow ocher in place of lampblack, giving a spruce color effect. If the shellac paint does not work free enough, about 5 per cent. of volume of Venice turpentine or Canada balsam can be added without retarding the hardening or drying features of the paint.

—1326—

Paint Perishing and Changing Color in Presence of Sulphuric Acid Vapors.

In an electric battery room, that contains about 300 cells for storing electricity, sulphuric acid and water are used and when the batteries are charged a dense mist (that is choking) fills the room. The walls of the room were painted with lead three months before the question was asked and are now covered with spots of large size that vary from brown to black. The original color was buff, white lead tinted with ocher, and done in flat over a first coat of varnish paint.

This problem is easily solved. White lead should not have been employed for painting the walls of the room, because it is a pigment that is most readily attacked by sulphuric or sulphurous acid vapors or sulphur gases, especially as an oil paint. That the paint did not discolor more rapidly was due to the resistance of the ocher and oil present. But when the oil was attacked and weakened finally the acid vapors obtained access to the white lead, forming the black sulphide of lead to which the discoloration is due. We would suggest that all the loose paint be scraped from the walls, so far as possible, and that you repaint the same with a coating made from lithopone, thinned with a good

varnish, that does not contain any lead salt, using pure ocher for tinting to the desired buff color. Lithopone is a combination of zinc sulphide and barium sulphate and it is not affected by sulphur compounds in any form. Any supply house will be able to furnish you with the article, dry or in paste form.

—1327—

Painting on Leather.

Oil colors will not suit for painting on leather, unless specially prepared, to keep from spreading on the outlines of figures when the painting is to be done on leather postals. The best method is to use artist's tube colors, or other good oil colors, that are ground stiff; mix them a little drier and flexible varnish, reducing with spirits of turpentine. Or color in japan may be employed, thinned with turpentine, to which a little flexible varnish is added for free flowing and giving elasticity.

—1328—

Black Lacquer for Articles of Leather.

There are many lacquers suited to leather goods of which the following selection are typical:

No. 1.—Digest 5 ounces aniline black in $7\frac{1}{2}$ pints spirits of wine, and then digest in the black fluid, 30 ounces ruby shellac, 1 ounce Venice turpentine, 1 ounce sandarac resin, and when they are digested, mix in one ounce of castor oil, and after resting for some time, pour off the clear fluid for use.

No. 2.—This is a good lacquer for harness:—Digest together at a gentle heat, in 5 pints of denatured alcohol, $1\frac{1}{2}$ pounds shellac, 5 ounces sandarac resin, 2 ounces mastic resin 5 ounces colophony, 5 ounces Venice turpentine, 1 ounce lampblack. If not black enough, one ounce of aniline black can be dissolved in the fluid along with the resins.

H. C. Standage.

—1329—

Fireproof Paint.

Ingredients:—Four pounds of asbestos powder, 1 pound aluminate of soda, 1 pound lime, 3 pounds silicate of soda; coloring q. s.; water q. s. Mix the solid ingredients together, then tint the mixture with the staining color; stir in the soda silicate and reduce with water to a workable consistency.

H. C. Standage.

—1330—

Fireproof Paint for Theatrical Scenes.

Ingredients:—Seven pounds zinc white, 3 pounds air slaked lime, 1 quart pure linseed oil, 1 quart silicate of potash of 33 degrees, 5 pounds dry white lead, 1 pound sulphate of zinc, water q. s. Mix the zinc white, lime and oil together, then stir in the water glass (potash silicate), and when this has combined, add the white lead and zinc sulphate, and then thin with water to the desired consistency. It should be mixed and used as wanted.

H. C. Standage.

—1331—

Painting the Walls of a Swimming Pool.

The walls of the swimming pool of an athletic club had been painted about two months with three coats of lead and oil paint, using the proper quantity of turpentine, when they showed spots like the skin of a leopard, the spots appear similar to black mold.

The best treatment for these walls under the conditions referred to is to have them perfectly dry, then if the lead and oil coats are sound, broom the surface well and give a first coat of zinc paint, made by using zinc white ground in oil, thinning it with pure spirits of turpentine and sufficient pale japan to make it dry hard and flat. Permit this coat to stand at least a week, and if, after that time, the spots reappear, then give a second coat of the same mixture, allowing a few more days for drying and hardening. For a gloss finish, apply paint made from best zinc white, ground in oil, thinned with a mixture of 3 parts raw oil of good body, 2 parts hard gum varnish (exterior) and 1 part turpentine. Lead and oil paint is proper for first coating, but too readily affected by water, both lead and linseed oil absorbing water quite readily, while the paint is comparatively fresh. So long as you have 3 coats of pure lead and oil paint on the walls you need not worry about the tendency of zinc white to crack. A certain European firm manufactures paints for the floors and walls of reservoirs, which is composed of specially treated denatured alcohol, shellac and other gum resins for medium with zinc white for pigment.

—1332—

Mixing Rubber with Oil Paint.

How may rubber be successfully introduced in oil paints; what sort of rubber is best and what solvent had best be employed, so that the rubber will not separate out in the form of lumps?

The most successful method to prepare a rubber solution that will mix well with paint is to procure pure para rubber, cut it into very thin slices with a sharp knife, that is dipped in water continuously. To make a complete solution of one pound of pure para rubber requires at least 20 pounds of spirits of turpentine. To hasten the solution a water bath is efficient, but the vessel must be well closed to keep the turpentine from volatilizing. A solution made in this manner will mix well with any oil paint, but of course, it is not very concentrated. The way to incorporate the greatest percentage of dissolved rubber into the paint is to use disulphide of carbon as the solvent, which process can be effected in a tightly closed jar. One pound of rubber requires from 6 to 8 pounds carbon disulphide. When the solution is complete, it may be mixed with linseed oil that is heated on a water bath when the solvent is driven off. But under no consideration must this be done near an open flame, as the solvent is extremely gaseous and inflammable. Coal tar benzol or solvent naphtha will also dissolve pure rubber and petroleum benzine may be employed as the solvent, but it is rather slow in comparison with the others.

If the use of carbon disulphide is undesirable and a quick solution of pure rubber is wanted, one ounce finely shredded rubber may be dissolved inside of three hours by placing it in a well stoppered bottle with 8 fluid ounces of sulphuric ether and 16 fluid ounces of petroleum spirit (benzine), shaking the bottle frequently.

—1333—

Painting a Steam Dredge.

Our advice was asked as to best way to treat the timber and ironwork of a steam dredge, and whether we would advise pitch or white lead for the wood and what we would suggest for the ironwork.

If cost is not too great an objection and appearance counts for something we would certainly suggest that you use white lead, tinted to the desired shade for the woodwork, or even a mineral paint, as we have seen dredges painted red or brown and also drab or lead color. In that case we would suggest the ironwork receive a priming of red lead and be finished with lampblack in oil. If the work must be cheap we would, as the best preservative for the wood, suggest the use of liquir coal tar, to which some turpentine drier is added and several coats of it. The iron could be coated with a cheap black varnish, but of course, frequent repaintings will be necessary in such case.

—1334—

Pigments and Medium for Water Color Painting.

As to the history of water color painting it is said that the ancient Egyptians used this method in their wall paintings. They covered the walls with stucco, traced the outlines in deep red, used a ground of white and colored the various parts. The technics of the wall paintings in the catacombs point to a similar method. The term "aquarelle" was applied to transparent water color paintings, while "gouache" indicated the opposite or opaque painting in water colors. This has changed during the last half century, so that both aquarelle and gouache are employed together. The pigments used in water colors are of both vegetable and mineral origin, the latter being more permanent. The medium consists of Senegal gum or gum arabic dissolved in water, or of a mixture of equal parts of these, and the same quantity of white rock candy dissolved in cold water. But the "moist" colors in tubes have come into use and are both safe, economical and save the artist quite a good deal of trouble, as he does not now require slab and muller. The principal pigments for water color painting are yellow ocher, raw and burnt sienna, burnt ocher, Indian red, Van Dyke brown, indigo, Indian yellow, vermilion, orange mineral, carmine, ultramarine, emerald green, stil de grain, lampblack, cobalt blue, red oxide of iron, Chinese (zinc) white, and for the lights the more opaque Cremnitz white.

In addition to the above we might mention aureolin or cobalt yellow, a transparent color, excellent for landscape painting, but not very stable in moist air, cadmium yellow, which is of good body and washes well, and is very useful in forming tints for clouds and sunset scenes. Orpiment or King's yellow cannot be used with white lead or chrome yellow, because it tends to blacken in such combination, and Naples yellow, a pigment of great opacity, and very useful in flesh tints, will decompose in the presence of other metallic oxides, but can be replaced by a mixture of cadmium yellow and Chinese white. For glazing purposes gamboge is used in the line of yellows. The madder lakes, red, rose and pink, are very permanent and brilliant and form a valuable addition to the line of reds. In the line of greens, oxide of chromium green, viridian and terra verte should be mentioned as very staple and useful. French blue replaces the native ultramarine, which is too expensive and too easily destroyed. Cerulean blue is very permanent when well prepared. Prussian blue is changeable in the presence of alkalies, which tend to turn it brown, and its use should be avoided, unless on surfaces, where alkalies are not evident. Antwerp blue is more unstable in water color than Prussian blue. Vine black or blue black is preferable to lampblack, where intensity is not required, because not so sooty. Purple madder or purple lake is useful for producing warm shadows. Brown madder, burnt umber and raw umber form good additions in the line of brown pigments. As to gray pigments, ultramarine ash is furnished as a moist color and assists in producing good atmospheric effects. Neutral tint is a gray compounded of blue, red and yellow, and cannot be relied upon for permanence. "Aquarelle" painting is usually done on paper, which must not be too coarse in texture, nor too heavy, but also on parchment, silk, stain or wood, without first preparing a ground.

—1335—

Imitation of Gold Color for Lettering.

The Standard Dictionary gives the formula as 11 parts white, 42 parts orange and 47 parts yellow. But almost every painter has his own way of mixing paint in imitation of gold. The best imitation we have seen was made from 60 parts by weight of flake white in japan, 33 parts lemon chrome yellow in japan, 5 parts deep English vermilion in oil and 2 parts burnt sienna in oil. A paler imitation of gold was made from 65 parts flake white, 32 parts lemon yellow, 1 part light chrome green and 2 parts burnt sienna, all ground in japan. A strong gold color, that will work out light and free under the striping pencil,

may be made from medium chrome yellow, zinc white and a trifle red. For old gold, mix deep orange yellow with French yellow ocher.

The best plan is to practice some, having some gold lettering or striping that has been varnished over for a guide, matching as close as is possible with paints.

—1336

Tenacious Paint for Sheet Metal.

Paint made in the proper way and baked on thoroughly will not crack or peel off from sheet iron or sheet steel when the metal is bent. Such a paint is best made from colors that are ground fine in paste form in pure boiled linseed oil and reduced to liquid form with a good, elastic baking varnish, which is applied in a flowing coat and immediately, before it has time to set too hard, placed into the baking apparatus. It must be baked at as high a temperature as the color will stand without change.

—1337—

Luminous or Phosphorescent Paints.

The pigments for luminous paints are prepared in various ways and by various methods. They are usually either barium sulphide, calcium sulphide or strontium sulphide. One method is to mix five parts by weight of artificial barium sulphate with one part by weight of charcoal, heating the mixture under cover over the Bunsen flame for thirty minutes and then for ten minutes over a blast lamp. This, when mixed with the proper vehicle and applied as a paint and exposed to direct sunlight for a few hours, will phosphoresce for quite a number of hours in the dark with an orange light. The same method with strontium sulphate and charcoal will give a bluish light, with strontium carbonate and sulphur a violet light, and calcium carbonate with antimony sulphide a reddish light. The manufacturers in Europe who have succeeded in the production of luminous colors have been very careful to keep secret the processes of manufacture on a large scale and our information is mostly based on laboratory work. One well known method is to mix 200 parts by weight of strontium carbonate with 60 parts sulphur and 4 parts sodium anhydride, 1 part sodium chloride and 4-10 parts sulphate of manganese, roasting the mixture for forty-five minutes at 1,200 deg. centigrade. This powder has a distinct yellow phosphorescence. For violet luminous color, a mixture of 40 parts by weight of calcium oxide, 12 parts sulphur, 4 parts starch, 1 part sulphate of potash, 1 part sulphate of soda and 2 parts of a solution of 1 part normal or neutral nitrate in 200 parts absolute alcohol with as little nitric acid as possible. This mixture must also be roasted for forty-five minutes at 1,200 deg. centigrade. Still another method is to take oyster shells, clean the same with warm water, roast them for say thirty minutes, and then allow to cool. Then the shells are bruised and the worthless outer crust is removed and thrown away. The remainder is then placed in layers in a crucible, each layer alternating with sulphur and finally the cover of the crucible sealed. The crucible and contents are then brought to nearly white heat and so held for one hour. On cooling the powder is removed and mixed with varnish of pale color or with a solution of gum in water. The intensity of phosphorescence appears to depend upon the presence of trifling portions of foreign matter or impurities, because from a mixture of chemically pure calcium carbonate with sulphur a pigment of lesser phosphorescence is obtained, than from oyster shells which contain, aside from calcium carbonate, quite a small proportion of other ingredients. The pigments deteriorate rapidly when coming into contact with air and only by mixing them at once with varnish or with gum and water solution, in which latter case they must be protected with a coating of transparent lacquer, can they be expected to retain their phosphorescent properties for any length of time. A word of caution. Varnishes used for grinding or mixing luminous paints must not contain any lead or manganese salts as driers, the drying or hardening properties must depend solely upon the

gums from which the varnish is made. Such varnish should contain about 15 parts by weight of hard, pale gum, Zanzibar or kauri being best, 25 parts linseed oil, boiled without drier, and 60 parts pure spirits of turpentine.

—1338—

Paint to Stand Drippings of Salt Water Filtering Through Coal Ashes.

Linseed oil paint, no matter what pigment it may be composed of, will not stand long enough to pay for its application. The action of the drippings mentioned will be equal to that of weak caustic lye. How long paint will resist the action of the drippings can be determined only in actual practice by comparison. In our opinion, a good coal tar and asphaltum varnish mixture will

—1339—

Pigment for Producing the Orange in a Painting of Sunset.

What orange pigment will produce most permanent and richest representation of sunset in an oil painting?

Pure cadmium orange, a variety of sulphide of cadmium, first introduced in 1862, a very brilliant and lustrous pigment, more mellow and beautiful in color and more permanent than the ordinary chrome orange, but, of course, much more expensive, nearly ten times more. It is more transparent than the latter, and generally used as a glaze over ordinary orange chrome yellow, but is simply invaluable for gorgeous sunset pictures.

—1340—

Good Wire Screen Paint.

For black, thin drop black in oil, with turpentine, to the consistency of liquid paint, adding a spoonful of liquid drier and thin with three times its volume of B. asphaltum varnish. Strain through cheese cloth or fine mesh paint strainer.

—1341—

Paint for the Inside of Steel Tank Holding Alternately Cold and Boiling Water.

We would not care to suggest any paint for this purpose, unless the paint could be baked on at a temperature of at least 300 deg. F. before being put into use with boiling water therein, and even then would not be able to guarantee success. The paint would have to be a varnish proposition, consisting of the very best asphaltum and hard gum, such as kauri with sufficient varnish oil to add binder to the gums, reduced for spreading with turpentine and baked at the temperature named.

—1342—

Metallic Paint in a Dark Green Shade.

Wanted to know whether a dark shade of green can be had in a metallic paint, and where such paint may be obtained.

You must not expect a mineral green in as bright or brilliant a color as is given by what we know as chrome green at the present day, but if you refer to a dark shade of bronze or olive green, it can be obtained from any reputable paint manufacturer, ground in paste form in pure linseed oil. A green of this kind with a mineral base, such as green earth, and shaded with bone black or mineral black and chrome green or chrome yellow, may be considered a metallic paint. Your usual source of supply should be able to furnish you material of this sort.

—1343—

Blue for Coloring Cement.

Limeproof ultramarine blue is the proper material for the purpose, but in purchasing you must specify the word "limeproof."

—1344—

Roughstuff for Wood and Iron.

There are any number of formulas for making this article, but the good old-fashioned roughstuff for car and carriage surfacing is made by grinding together equal quantities, by weight, of Reno filler, raw or burnt, according to choice, and white lead in oil in a mixture of equal parts, by measure, of coach japan and quick rubbing varnish to the consistency of a medium paste. For application it is thinned with spirits of turpentine to brushing consistency. This material could be used on iron surface also, but it is rather too expensive for the purpose, and iron fillers are used instead. These are also made on different formulas, the most common, however, being made by grinding black filler, a sort of ground shale, with some whiting in a mixture of oil, japan and varnish in the consistency of soft putty, so that it can be used as a filling when applied in that form, or as

—1345—

Stamping Black for Wood.

H. B., Baltimore, Md., asks:—Can you favor me with a recipe for making a stamping black for use on wooden cases with metal stamps?

Answer:—The best black for this purpose that we know of and one readily prepared and which does not bleed out, is made by mixing fifteen parts, by weight, of best calcined lampblack, six parts, by weight, of gum arabic, six parts, by weight, of refined glycerine and five parts, by weight, of water. The gum is first dissolved in the water and the solution strained to remove the impurities in the gum, then it is mixed with the glycerine and finally the lampblack stirred in. The grinding may be done in the mortar with the pestle or on the grinding slab, or if in large quantities in a paint mill.

—1346—

Limeproof Blue for Coloring Cement.

Ultramarine blue is not all limeproof, and only that which is known as sulphate ultramarine blue can be so considered, while soda ultramarine is out of the question. Among the coal-tar blues we may mention marine blue and Victoria blue R. Both of these are very similar to the ultramarine blue with a reddish undertone. Nile blue BB is also light and limeproof.

—1347—

Coloring for Waxes, Oils, Fats, Etc.

For coloring waxes, such as paraffine, carnauba, ceresin, etc., if they are to be transparent, the best means are the basic coal-tar dyes known in commerce under the name of fat anilines or oil soluble anilines.

For russet, Bismarck brown is most available unless an opaque coloring matter is desired, in which case Cassel brown or Vandyke brown will answer. A brown polish is obtained by coloring the wax and oil or other fat with Bismarck brown to which some fat nigrosene has been added. For the black polish nigrosene is the proper dye.

—1348—

Paint for Gasometers.

Kind of paint gas companies specify for the painting of their gas holders or tanks.

The writer has quite a large experience on this subject here in the East, and has seen any number of gas holders in the course of erection and also during the process of repainting, but if there are any specifications issued on painting these holders it relates only to new tanks and structures. Red lead paint is, so far the writer has noted, invariably applied for priming and first coat, sometimes even as a third coat, and red oxide of iron for the last or finishing coat. The tank builders purchase and apply the paint, and it is doubtful if the very best material is used by them. At least the writer has known ordinary roof paints to go over the red lead coats. For repainting gas holders some companies do not look for durability of the paint, but to low price, while there are a few large concerns in some of our big Eastern cities that employ engineers who are alive to the fact that a good paint is cheapest in the long run. They have rust spots scraped and touched up with pure red lead and linseed oil, and after a time the whole surface is gone over with a red paint composed of 60 per cent. sesquioxide of iron, a small percentage of zinc oxide and whiting each, balance of pigment being silica, the vehicle pure linseed oil with not more than 6 per cent. turpentine drier.

One company has made a trial of using aluminum paint, having had several holders painted, and it appears to have stood well for eighteen months, the tests not being completed. A new scheme is to coat the top of a holder with several coats of red lead paint, then give several thin layers of cement, sand and asphalt. How this will turn out is problematical, but of course it is only for tops of holders.

—1349—

One Coat Gloss Paint on Wood, Tin or Iron.

Soft woods, such as poplar, white or red pine or spruce, are very absorbent, and that therefore it is impossible to produce any paint that will stand out with gloss on this sort of lumber in one coat. On hard wood, such as oak, beech, hickory, etc., it can be accomplished, though coarse grained wood will not show the gloss of the paint in the grain. On tin or iron it is a comparatively simple matter to bring about a glossy surface with one coat of paint. It may be of interest to know that articles of soft wood that are not exposed to the weather after being painted may be dipped into a glue size first, which will fill the pores of the wood, then permitted to dry hard and it is then dipped into a thin paint of colored varnish and suspended in the air to dry. In the case of hard wood of close grain the glue size coating is dispensed with, but the varnish paint in this case must be fairly stout, so that it will dry out with a good gloss. As to tin and iron, a priming is not required, as a paint can be made by mixing strong colors or opaque white that are ground fine in japan or varnish with a mixing varnish of proper consistency and the articles may be dipped into this preparation, or where dipping is not practicable, the paint may be applied with brushes. It is well to note, however, that for toys the paint pigments should be of a non-poisonous character.

—1350—

Odorless Paint for a Metal Lined Pantry.

If the room can be well aired after painting, and before any provisions are stored therein, a good flat wall finish, followed by a finish of white enamel that is washable would fill the bill. Onions cut in half are said to absorb the odor of paint and sufficient ventilation may do the rest. However, if you will mix dry white zinc with sufficient silicate of soda (water glass) of 33 degrees Be. to make

the mixture spread well you will have a white enamel that is odorless and washable when dry. But do not mix more than you can apply the same day and put through a fine sieve.

—1351—

Hard Drying Black Gloss Paint for Ironwork.

For the first item a good benzine asphaltum varnish, to which is added a moderate quantity of pure lampblack ground in oil, say about one pound of the latter to one gallon of the varnish. The lampblack must be first beaten up with a stick, then the asphaltum varnish is added gradually, a tablespoonful at a time, stirring the mixture well until it becomes a soft batter and is free from lumps, when the balance of the varnish is stirred in. If too stout to work freely under the brush, add some turpentine substitute or benzine. Finally run it through a paint strainer and it is ready for use. The lampblack in oil is added to the asphaltum varnish to take away the brownish cast and to increase the body or covering capacity of the varnish, also to increase the elasticity and toughness to a slight extent.

To make a first-class black varnish for finishing engine cabs and tanks, it is absolutely necessary to grind a high-grade carbon black or drop black or a mixture of these on a water cooled paint mill in a high-grade engine rubbing or finishing varnish, impalpably fine, to a soft paste, which is reduced to flowing consistency with the required quantity of engine finishing varnish and then strained through a very fine sieve or strainer. The time of drying depends entirely on the varnish used for grinding and in reducing. This feature can be determined only by practical trial.

However, unless you have the facilities for grinding the black as described it would be false economy for you to attempt to make your own blacks for the reason that you can purchase a very good engine finishing black at the price that you would have to pay for the clear varnish. You must consider that paint and varnish makers who work on a large scale can purchase the raw materials at prices very much lower than those that you would have to pay.

—1352—

Cold Process Black Dipping Lacquer.

Method for preparing a brilliant black lacquer, into which small articles of metal may be dipped; the lacquer to dry as rapidly as possible and yet adhesive and hard.

The preparation of dipping lacquer by cold process can only be accomplished with a spirit lacquer as medium or vehicle. A formula that has produced good results is as follows:—Fourteen parts by weight of bleached gum shellac, two parts also by weight of genuine Venice turpentine dissolved in forty parts by weight of 95 per cent. alcohol (denatured or methyl), to which sufficient spirit soluble nigrosine is added, the quantity to be determined by test for covering the metal in question. Highly calcined lampblack may be used in place of nigrosine, but it must be first moistened and triturated with the spirit and when sufficient has been added to the spirit lacquer the whole must be strained through fine muslin. Nigrosine, however, is preferable to lampblack, because it will produce a much deeper black.

Another formula is as follows:—Four parts bleached gum shellac, four parts gum sandarac, two parts gum elemi, one part spirits of turpentine are added to twenty-eight parts 95 per cent. alcohol, all parts being by weight. When solution is perfect spirit soluble nigrosine is added in the quantity required as determined by testing. Either of the foregoing spirit lacquers may, if so desired, be performed by adding 1 per cent. by weight of oil of lavender, and may be made to drip more freely by further diluting with alcohol. This, of course, must be determined also by practical working test.

—1353—

White Paint That Will Not Discolor from Heat or Steam Vapor.

White lead and linseed oil paint will invariably discolor rapidly under the conditions named, and even pure zinc white in oil would not be a great deal better, because of the oil being affected by the steam vapor, although zinc white will not discolor so readily from the heat as lead. The best white for the purpose would be one made from zinc white ground in damar varnish thinned with turpentine, so as to dry a nearly dead flat. This to go over the discolored lead and oil paint. Over this a finishing coat of zinc white ground in damar varnish thinned to brushing consistency with either damar varnish or a good white enamel varnish. If there is no objection to the ceiling being in flat effect, two coats of the flat paint as outlined for first coat would cover well over the discolored ceiling. Beware of lead and oil as a finish where there is much heat and steam if you wish a clear white effect.

—1354—

Swedish Paint for Wooden Surfaces.

Under the name of Swedish Paint is understood an emulsion of linseed oil, fish oil or train oil with a solution of soda or potash in water, to which pigments of earthy nature are added in order to give hiding power. From samples examined in this country it has been found that this material is more adapted to the northern climates of Sweden and Finland or Russia than for the United States. At any rate, from its general composition it appears that it is better adapted for conserving timber, because of the non-drying train oil, than for a paint of the character required for both preservation and decoration of our homes. The best and highest-priced quality is made by grinding 200 parts by weight of zinc oxide and twenty parts yellow ocher ground in boiled linseed oil to a soft paste, which is thinned with 120 parts by weight of train oil (whale oil), twenty parts turpentine and three parts liquid drier. To this is added a potash or soda solution in water, in such quantities as to meet the selling price. Another and cheaper method to make this coating for rough wooden surfaces is as follows:—One pound of vitriol (zinc sulphate) is boiled in two gallons of rainwater until fully dissolved. With this hot solution five pounds of rye flour is cooked into a mush-like mass, into which is stirred, while continually stirring, three pounds of whale oil into which has been melted over a fire two pounds rosin, stirring until it is one homogeneous mass. To this is added a yellow ocher that has been mixed to creamy consistency with hot water. This makes a fair color for natural wood tones. For a greenish color green earth is used, for red bole or burnt ocher. Mineral colors are not permissible. If the paint is too stout to work freely it is thinned with hot water.

—1355—

Diamond Dyes for Painting Stage Scenery.

Stage scenery painters as a rule do not size the cloth or canvas they use, but buy it ready sized, as any well sized muslin or canvas will do for that class of work. A good size can be made, however, by using equal parts by volume of corn or wheat starch and bolted China clay, beaten up in cold water until free from lumps and then boiled with steam to proper consistency for use.

Diamond dyes, being soluble in water, can be mixed with whiting or clay, same as in distemper work by adding a binder in the shape of gelatine, glue or dextrine, the base of whiting or clay being necessary to give body to the dye.

—1356—

Pigments for Use in Spirit Lacquers.

What pigments are safe to mix with spirit lacquers, such as are made from solutions in spirit of wine, as shellac or gum sandarac, benzoin or elemi, etc.? Refers to opaque pigments only.

The chief requisite for these pigments is finest pulverization and light specific gravity, also absence of grit in the earth or mineral pigments. Most any pigment that has no tendency to thicken in contact with resins may be selected. Red lead or red lead vermilions, and any pigment containing free lead oxide or free zinc oxide must be barred out:—Chrome yellow, chrome orange, chrome red, Chinese blue, lithopone, lampblack, manganese black and brown, ochre, red or yellow, red oxide (native), sienna, raw or burned; umber, raw or burned; ultramarine blue, ultramarine green, zinc yellow and zinc green. All the latest coal-tar derivatives that are precipitated on a base of blanc fixe may be employed with safety, and the lacquers that are colored with these will be found to hold up well in their liquid form. These are too numerous to mention here, and if you will consult some reputable supply house in your city they will no doubt be in position to furnish the information for which we have not the space here.

—1357—

Phosphorescent or Luminous Paint.

Luminous paint for ordinary sign work, such as house numbers, may be made as follows:—Mix 12 pounds white lead in oil, four pounds French zinc white in oil with one pint bleached linseed oil, one pint pale gold size, one pint white japan and one pint turpentine and when thoroughly mixed add one pound of freshly calcined sulphide of calcium, which will produce one gallon of white paint that will be luminous in the dark, providing the calcium sulphide is put into the paint after having been heated to red heat. Remember, any surface painted with luminous paint must be exposed to strong light for a time, otherwise it will not show up in the dark. Perhaps the best thing for you to try would be to make a paint from lithopone, which, as you probably know, darkens on being exposed to strong sunlight when mixed with certain varnishes and returns to whiteness again at night. Take a portion of lithopone and mix to the consistency of paint in damar, or other pale varnish, and if this alone will not show up luminous then add calcium sulphide at the rate of one pound to a gallon of the lithopone paint. Your paint supply house may be able to procure the calcium sulphide for you. There are many ways and methods for preparing luminous paints, but these require special apparatus and a knowledge of chemistry, and really, the best of them are more for pastime than of any practical use, because their action is only short-lived.

—1358—

Pure Zinc White Paint for Use on Paper Mills.

The chemist of a certain town in which there is a paper mill advised the use of pure white zinc on the mills, as the acid from the paper discolors all other paint applied.

The chemist's advice is correct from his standpoint. The sulphuric acid vapors about paper mills are very apt to discolor any surface painted in white or delicate tints that are made with any lead carbonate (corroded lead), or have a portion of such in their composition. Zinc oxide (white zinc) is not discolored by sulphur gases so long as corroded white lead or lead driers are kept out of the paint.

Lithopone white paint (zinc sulphide and barium sulphate) is unaffected by sulphur gases, but is very apt to darken on exposure to sunlight when used as a pure white. Zinc white has poor hiding power, and unless specially mixed with treated linseed oil, the paint is apt to crack and flake at an early period after

application. But there is another material that will give you a white paint of good body and hiding power that will also wear well and is immune to the effect of sulphur gases, and which any reputable paint grinder will prepare for you to specifications if you order in quantity. This is a mixture of basic lead sulphate or sublimed white lead and zinc oxide, 75 per cent. by weight of the former and 25 per cent. by weight of the latter, ground in soft paste form with linseed oil, which you can thin for use in the usual way for exterior application.

—1359—

Mica Decoration Paint Over Colored Groundwork.

How is a silvery luster effect produced on some decorations, such as signs in stores, that vary much in color but have always a glittering appearance?

What you refer to is simply the mineral mica in scaly form, which can be obtained in powder as well as in scales of various sizes, and much of which is used by simply sprinkling it on a size when applied to Christmas toys. Some years since there was a fad to have it on picture frames, etc., and a certain color maker obtained a patent on the coloring of mica with aniline colors. So far as we know, the patent is not now in force. But you need not infringe, even if the letters patent are still valid, by following this process—Mica as received is usually intermixed with dirt, and must be cleaned. This is done by heating it to red heat in a crucible, and while in that state throw it into water, grind it in water, dry, and pulverize it.

In this state it is fireproof and transparent. Make it into paint by mixing 40 parts by weight of the powder with 60 parts by weight of pale boiled oil. This may be colored with any transparent pigment, but the best effect is obtained by applying the pure mica in oil over vari-colored signs or ornaments, producing stunning effects, especially under electric light. Instead of using boiled linseed oil with the mica, silicate of soda of 33 degrees Be. may be used, making a first-class fireproof coating.

—1360—

Formulas for Government Whitewash or Lighthouse Paint.

The formula that has been in use for many years, and with which it is believed the original White House at Washington was coated, is as follows:—Slake in a fifty-gallon cask or barrel one-half bushel of freshly burnt builder's lime with boiling water and cover top of barrel with burlap to keep in the steam. When cooled, sift the slaked lime through a fine sieve into another package and add seven pounds of dairy salt previously dissolved in hot water, also three pounds of rice flour boiled to a thin paste and stirred in boiling hot, also one pound of pale glue that has been soaked in cold water and then made liquid by melting in enough hot water. Then add five gallons hot water and let it stand, well covered, to keep out dirt, for a few days, when it should have formed a thin sort of jelly. It must be applied quite warm, as hot as the brushes can bear, hence must be warmed in a vessel set in a portable kettle over a fire. A so-called whitewash specified some time ago for lighthouses is as follows:—Take of fresh Rosendale cement, three parts by measure; clean, fine white sand, one part by measure; mix with fresh water very intimately. This makes a sort of granite color. If wanted nearly white, shake two parts, by measure, of fresh burnt lime and add one part each of cement and white sand. Make it as thin as can be applied with a kalsomine brush. Before applying, wet the surface well all over and stir the material before and during use.

—1361—

Fire Resisting and Weatherproof Paint for Wooden Sheds.

The best material, though not the very cheapest, will be coatings of water-glass (silicate of soda or potash, preferably the latter). The method is as fol-

lows:—First give the wood a treatment with dilute silicate of potash; that is, mix silicate of potash of 40 degrees Be. with its own volume of water and use a stubby or fiber brush liberally, so that the wood becomes well saturated. When this is dry, use the same dilute waterglass to which any good earth color, such as ocher, red oxide, mineral brown or green earth has been added, or if wanted in white, asbestine powder and china clay will do, applying this as a second coat, which permit to dry hard. Then give a final coat of undiluted waterglass of 40 degrees Be. and the job is finished. An old patent now not in force gave the following:—

Thirty pounds silicate of magnesia (asbestine) are mixed intimately with 20 pounds dry white pipe clay; 10 pounds borax are dissolved in 30 pounds hot water and to this is added 10 pounds waterglass of 33 degrees Be. All these ingredients are mixed and made fairly warm, then ground in a suitable mill until fine. This can now be used as a white paint or any earth color that is desirable may be added in pulverized form, but colors that are affected by alkalies must be avoided. Borax has the property of entering more deeply into the wood than waterglass alone.

—1362—

Acid-Proof Coating for Laboratory Tables.

Some nine years ago a painter finished the tops of tables in the laboratory of a college, which have been fairly acid proof ever since. These tops were made of birch. Now he is to repeat the operation, but has forgotten the formula that he was then working on. As nearly as he can remember it was as follows:—There were two solutions applied to the tops. No. 1 was applied and when dry the wood was the color of medium chrome green. Then it was gone over with soap and water and when dry it was given another application of this solution, washed again with soap and water, and when dry the wood was grayish green. Then solution No. 2 was applied twice, being washed each time with soap and water, and the result on drying was a jet black. When dry, the tops were smooth sandpapered, and a thin coat of paraffine wax was applied with a hot flat iron, after which a heavy coat of paraffine wax was ironed well into the wood. He only remembers that solution No. 1 consisted of soft water and hydrochloric acid and some other acid, and that No. 2 was soft water and two kinds of acid. He asks whether we can inform him what treatment, if any, would produce a similar result.

You do not require acid solutions to produce the black stain, and these solutions are really of no benefit, as the acid-proofing of the table tops is entirely due to the paraffine coatings. The following stain will give you the black effect with far less trouble than you had with your acid staining:—

Take 8 ounces of sulphate of iron (green copperas), 2 pounds extract of logwood, 3 ounces nut galls, 2 ounces of Chinese blue, 4 ounces carbonate of iron, and boil these in one gallon of strong vinegar, over a moderate fire, for two or three hours. When cooled, strain and apply either hot or cold. If one application does not give a jet black on drying, give a second one. For quicker results dissolve extract of logwood in only enough wood alcohol, until you obtain the desired strength, then strain and apply. By going over this with a tincture of muriate of iron, you may develop the color to any depth.

Follow your method of smooth sandpapering when the black is developed and dry, and apply the paraffine wax in the manner you indicate. The acid treatment you speak of is only to ebonize the wood, but has no real value as to the wear of the table tops.

As to the nature of the acids in the solutions referred to by you, we doubt whether there were two acids in either of the solutions, and do not care to venture any guess at the nature of the other ingredients.

—1363—

White Enamel for Steam or Hot Water Radiators.

You can obtain a white enamel from any reputable varnish manufacturer, one that will not blister or flake off from the effect of the heat, but the radiator is apt to sweat and thus to throw off the coating, unless the metal is well primed before the enamel is applied and the heat permitted admission only gradually at first. In other words, the ground coats as well as the enamel finish should be baked on. White baking enamel is the proper material, and even this cannot be guaranteed to remain white permanently, unless the temperature is kept moderately low. No white enamel applied directly to heated metal surfaces will keep its whiteness for any length of time, and we are not aware that plumbers can obtain anything special in that line.

—1364—

Silicate of Soda Paint for Woodenware.

Silicate of soda is strongly alkaline, and you cannot use any pigment with it and keep color from being destroyed. The pigment must be alkali-proof, and must be first pulped and ground in water to a smooth paste. The best plan is to purchase silicate of soda of not less than 40 to 45 degrees Baume and as this grade is too heavy in gravity to use as thinner for paint, the dry pigment is to be pulped as above and run through a mill or strainer to make it free of lumps. Then as much silicate of soda of 40 to 45 degrees Baume by weight should be added little by little, as the weight of the water that has been used to make the paste, the mass beaten up well and passed through a paint strainer of medium fine mesh, so as to avoid granular appearance of paint. If too stout add more silicate of soda and water in equal portions by weight. Never mix silicate of soda and water by measure, as in doing so you would have too great a proportion of silicate of soda. Silicate of soda of 45 degrees Baume weighs approximately 11 pounds per gallon, while water weighs only 8 1/3 pounds. Take good care that the silicate of soda is kept from freezing.

A few formulas for ordinary silicate of soda paint follow as a guide, but need not be strictly adhered to as to nature of the base pigments, while this must be done in the coloring matter and the vehicle:—

For White Paint.—50 pounds dry white lead, 10 pounds American zinc, 40 pounds barytes, 100 pounds whiting, 50 pounds clear water. Pulp into a paste and reduce with 50 pounds silicate of soda of 45 degrees Baume.

For Blue Paint.—100 pounds ordinary lime-proof ultramarine, 60 pounds china clay, 100 pounds barytes, 90 pounds clear water. Pulp this and reduce with 75 pounds silicate of soda, this requiring more water.

For Buff Colored Paint.—100 pounds barytes, 60 pounds dry white lead, 80 pounds china clay, 40 pounds French yellow ocher, 5 pounds Venetian red, 50 pounds clear water, 20 pounds silicate of soda. Pulp this and reduce with 50 pounds silicate of soda, and if too pasty to work add equal parts by weight of water and silicate of soda.

For Green Paint.—75 pounds French yellow ocher, 40 pounds lime-proof ultramarine blue, 100 pounds barytes, 35 pounds china clay, 50 pounds clear water. Pulp and reduce with 50 pounds of silicate of soda. If too stout add silicate of soda and water in equal portions by weight.

For Black Paint.—40 pounds mineral black of fine grade, 30 pounds vine or vegetable black, 50 pounds whiting, 100 pounds barytes, 90 pounds clear water. Pulp and reduce with 75 pounds of silicate of soda.

For Red Paint.—100 pounds medium shade of Venetian red, 50 pounds whiting, 100 pounds barytes, 90 pounds clear water. Pulp and reduce with 90 pounds silicate of soda.

In applying silicate of soda paints to wood the surface must not be extra smooth and the paint must be well stirred during application, otherwise the paint is liable to creep under the brush. The brushes must not contain oil, but if used previously in oil paint should be washed out with soap and water and

good fibre brushes are best for use in this paint, as it would be wasteful to use expensive hair bristle brushes. One coat will hardly suffice to cover woodenware and produce the desired finish, as the first coat is bound to dry out flat.

—1365—

Solution for Turning Copper Green.

To produce the green color on copper, that is, the green incrustation known as patina, which is produced on bronze or copper ornaments by age on long exposure to the elements, repeated washings with strong vinegar or acetic acid alone will produce the same effect, but the following is a much quicker method:—Dissolve four ounces distilled verdigris (the French article being best) and two ounces sal ammoniac crystals in one quart of strong acetic acid and with this solution wash over the copper surface repeatedly, allowing each coat to dry before applying another. When the proper effect has been obtained, rinse well with clear water, allow to dry, then brush with a dry brush, and, if so desired, coat over with a good pale varnish.

—1366—

Shingle Paint Made with Creosote, Crude Oil and Graphite.

We do not approve of a paint for wooden shingles containing crude oil. We believe that wooden shingles should be dipped into stain before being laid, and then given a coat of the same stain, applied with a brush.

The stain may be made with or without creosote oil, but in order to penetrate into and preserve the wood, it must be rather liquid and not like a paint.

No matter what you use as the pigment, this should not be used in the dry powder but should be ground in linseed oil to a medium, stout paste, that will break up readily. To avoid having the stain running off the roof during a driving rain storm before it has set hard, some drier should also be added. If you prefer graphite to mineral brown or red, break up say fifteen pounds of graphite in oil, with one gallon japan drier and dilute with four gallons creosote oil and four gallons heavy benzine or kerosene oil. This will make ten gallons shingle stain. If you want paint for brushing over old shingles use thirty pounds graphite in oil, one gallon drier, three gallons creosote oil and four gallons heavy benzine or kerosene oil to make ten gallons.

—1367—

Paint for Exterior Rough Cast Walls.

Any good oil paint, such as used for exterior walls, white or tinted to suit, preferably made from white lead and zinc oxide, with linseed oil as the binding medium.

—1368—

Buttermilk Paint for Barns, Etc.

Wanted to know value of buttermilk paint for barns, fences, etc.

Our experience with the application of lime wash made with skimmed milk in place of water has been such that we would not care to recommend it, as no matter whether it was made with whiting instead of lime and with or without glue, the coating did not last over part of a season, but disappeared by flaking or powdering. Many formulas have been tried without success.

—1369—

Coating for Pneumatic Decoys to Make Waterproof and Non-Cracking.

Dissolve pure para rubber in coal-tar benzol of 90 per cent. Cut the rubber in shreds, by wetting a very sharp knife with water; place the shreds in a can or pot and put enough benzol over them to cover. This will make the rubber swell and soften, then add more benzol and, if you want to hasten solution, place can in a hot water bath with a cover on the can. Stir occasionally and add more benzol, until you have a clear solution of the consistency of a coach varnish. Brush this over your pneumatic articles and let it set up, when you will find a rubber-like coating that will not dry hard enough to crack and is perfectly waterproof. Do not attempt to use benzine, gasoline or turpentine to dissolve the rubber. To one pound of pure para rubber you will require about one gallon benzol. Should there be any impurity in the solution, strain it, while fairly warm, through a fine wire sieve or bolting cloth.

—1370—

Dipping Paint for Toys Made of Composition of Clay, Calcined Plaster and Portland Cement.

When the toys are thoroughly hard throughout, either by the baking or air-drying process, put them in a bath of pure linseed oil, warmed to a temperature of between 100 or 110 degrees F., and let them remain in the oil for a few hours; then remove the toys or figures to a screen or wire sieve of suitable size to drain, then in a dry place free from dust. When dry, the toys or figures will look like wax and may be washed without injury. If the toys are to be colored, the linseed oil can be stained with color ground fine in oil, before it is warmed, but should first be strained through cheese cloth or a fine wire sieve to avoid lumps or specks showing on the surface on drying. This is the simplest method for painting the articles you refer to and also most durable.

There are other treatments with chemical solutions, but they are either too complicated, many of them tending to disintegrate the composition of the toy or too expensive, while most of these are unsafe for toys handled by children, unless harmless colors are selected. When using the oil dipping process, most any color or pigments, excepting those containing lead or lead chromates, mercury or copper or arsenic may be used. Silicate of soda (water glass) as the medium for paint is not durable enough, when used alone and in connection with the required other ingredient, becomes complicated, aside from the fact that alkali proof colors only can be employed with sodium silicate.

—1371—

Luminous Paint for Backing Transparent Celluloid Signs of Lasting Quality.

We are somewhat skeptical as to the ability to obtain the proper material for the purpose, the writer having had more or less success during the last 25 years in producing the material in a satisfactory way. It seems very simple, yet when it comes to a crucial test it fails in one way or another. The principle is highly calcined or roasted sulphide of calcium, the best being oyster shell lime in fine powder, combined with sulphur in muffle furnaces, but when this combination is only very slightly exposed to the atmosphere, no matter how dry it may be, it still absorbs a certain degree of moisture and loses its luminosity when mixed with the vehicle, which must consist of a transparent gum varnish. To overcome this, the calcium sulphide must be re-roasted before the mixing with the varnish vehicle, that in turn must be free of moisture.

To enumerate here all the various methods of producing the luminous paints that have been tried and failed would fill a book and we have not space enough for that purpose. To make a long story short, the principle of a luminous paint is, that the longer it is exposed to sunlight during the day time, the longer it will phosphoresce in the dark, but at the same time the material in the first place requires to be as indicated above and great care must be exercised in compounding it with the varnish. The very best and most lasting luminous paint is the white that gives a light with a slight violet tinge.

—1372—

Fireproof Paint For Exterior Wooden Surfaces.

Although we believe in the possibility of paint retarding the spread of flames on wood, we have never taken much stock in claims that paint, especially oil or varnish paints, can be produced that are actually fireproof. Yet, while we cannot vouch absolutely that the following is proof against fire; we think it is fire retardent and when dry and hard on the surface will not permit the flames to gain great headway. The recipe calls for the following:—Mix with enough raw or refined linseed oil to make a soft paste seventy pounds of zinc oxide and thirty pounds air-slaked lime. Run through a mill, then add to this in a paint mixer one gallon soluble glass (silicate of soda) of 35 deg. Be., fifty pounds white lead in oil (paste), ten pounds zinc sulphate, dissolved in one gallon of water. Mix well and if too stout thin with more oil. This paint will be fairly white, but may be tinted with color ground in oil to any desired shade.

—1373—

Quick Drying Gloss Black, a Non-Conductor for Electricity.

While rather high for cost at this time, the very best that can be made to serve the purpose is made by dissolving gum shellac in rectified wood alcohol and coloring the resulting solution with nigrosine dissolved with wood alcohol. The process is very simple. Four pounds of T. N. shellac which is lowest in price, is placed in a wide-mouthed jar, and one gallon of wood alcohol poured over the gum, and the mouth of the jar tightly corked and the jar set in a warm place. From time to time the contents of the jar are shaken vigorously or stirred with a glass rod or clean paddle of hard wood until all the gum is dissolved. The solution should be strained through cheese cloth and in the meantime two ounces of nigrosine black soluble in alcohol should be triturated in that solvent and made thin enough to mix readily with the shellac solution. If the resulting black dries too quickly, add a few ounces of artificial Venice turpentine.

If you do not care to go to the expense of the alcoholic shellac solution you can prepare a non-conductive gloss black at less cost by mixing a good grade of asphaltum varnish with coach japan that is made with a shellac base and thus obtain a glossy black with some non-conductive properties, although to a lesser degree than that of the preceding formula.

The mixture should consist of 4 parts of asphaltum varnish to one part of coach japan, by measure. If too stout, thin with a moderate quantity of benzine, but never with turpentine, as this will impair the gloss. Unless you are equipped with apparatus for making asphaltum varnish, we would suggest that you purchase the latter and do your mixing in the cold way. The addition of the coach japan is for the purpose of reinforcing the insulating properties of the asphaltum by the shellac base in the japan, as well as to insure more rapid drying. The asphaltum varnish itself, of course, must be fairly quick drying and at the same time not too brittle.

—1374—

Fireproof Coatings for Wooden Surfaces.

Mix 95 pounds ground barytes and 5 pounds zinc oxide, both in the dry state, intimately. In a wooden tub place 8 gallons, imperial measure, of soft water and stir the dry barytes and zinc mixture into it with a stout paddle, until the mixture is uniform and free of lumps. Now add 100 pounds of silicate of soda (water glass) of 35 degrees Be., stirring thoroughly. This will dry out fairly white, when applied with a large wall brush, in about 30 minutes, when another coat may be given. A third coating will make the wood fireproof at small expense, but it is best to prepare only enough for two or three days' work, and the material should be frequently stirred while being applied.

Another method of fireproofing wood is as follows:—Dissolve 6 pounds of alum and 2 pounds green vitriol in 12 pounds hot water, and while still warm, the solution is applied twice in succession to the wood with an ordinary fiber brush. When this has dried, apply 2 coats of a mixture of potter's clay, sifted and finely crushed in water.

WHITE LEAD.

—1375—

Binder That Will Keep White Lead from Chalking.

Is there any binder besides linseed oil that will prevent white lead from chalking?

When settled raw linseed oil is the only binder we know of that will keep pure white lead for the longest period from becoming disintegrated by the so-called chalking process. It has been found that a certain percentage of zinc white with white lead paint corrects the tendency to chalk and that inland an addition of 20 pounds zinc white in oil to 80 pounds of white lead is the limit while on the seashore from 30 to 40 pounds zinc white to from 60 to 70 pounds white lead is the maximum in producing good wear, neither chalking nor cracking nor scaling of the paint being noticeable.

—1376—

Avoiding Waste of White Lead.

Take, for instance, a six hundred pound barrel of white lead. You may scrape it down and get it as clean as you can, but there is still quite a little white lead left to harden there, unless you save it. If you take a little turpentine and scrub down the sides of the keg with turpentine and the stub of an old brush, you'll be surprised at the quantity of white lead that can be recovered by a few minutes' work. Turpentine would be pretty expensive to use for cleaning down white lead barrels if you wasted it, but you don't. You can put the turpentine and the white lead right into the paint you are mixing for it is all good.

The Veteran Painter.

—1377—

Is English White Lead Superior to American?

Is English white lead better, that is, will it wear longer on the exposed surfaces of houses than the domestic brands when used with the same brand of linseed oil?

In our opinion the American brands of strictly pure white lead are fully equal to the English white lead that comes into this market. They are of the same degree of purity, and we believe that the perishing of white lead paint depends in a great measure on local conditions, as well as on the linseed oil and driers that are employed to thin it for spreading. And last, but not least, the life of white lead paint depends also upon the manner of application. Of course the purest and best white lead may be prepared in a careless manner, but we feel certain that the standard American brands are prepared as carefully as any imported white lead on the market.

—1378—

Benefit of Having White Lead and Linseed Oil Paint Stand After Mixing.

Not only one of the largest railway systems of this country, but other large consumers as well have the white lead and linseed oil paints mixed in their shops on a large scale and enforce the rule that the keg lead must be worked with a strong paddle first, to bring it to a uniform consistency; then a certain quantity of japan drier, usually brown or coach japan, is added by thorough incorporation with the paddle and allowed to stand over night, if at all possible. In this way the drier will have spent its action on the lead and when the oil is added there is no danger of drowning the lead by misconception. When there is time to do so,

the paint so mixed is permitted to remain undisturbed for a day or two at least and then it is finished by thinning to the proper degree of liquidity for priming or finishing coats.

We would strongly advise any one so inclined to make the trial, i. e., to mix some lead as described and then mix some from the same package directly before application, apply the two mixtures side by side on similar surface, comparing working qualities and the body after the paints have dried. If equal quantities of lead, oil and drier have been used in either the results will be surprising. Why? Because the ripened mixture has imparted some of its basic properties to the oil and the drier has had an opportunity to act on the oil and pigment, which is not the case with the quick mixture.

—1379—

To Keep White Lead in Oil from Drying Out or Crusting.

When white lead is kept in wooden kegs for a long time, the oil will naturally ooze out through the joints, which open as the wood shrinks. The proposition to keep it in galvanized iron tanks is perfectly feasible, but we would suggest that you might as well use tanks made of light boiler iron, riveted flush inside and given a few coats of flat white, as a galvanized iron tank must be painted or varnished inside anyway, so that the water, which is placed over the lead to keep it soft, will not cause rust.

—1380—

What Is the Safest Material to Add to White Lead?

What is the best and safest article to use in white lead—whiting, barytes or silica?

The safest thing to use in white lead is white lead. There is nothing that I ever saw that you can put into white lead to improve it, except the earth tinting colors, like umber and sienna. A small percentage of these colors will so materially stop the chalking of white lead as to render it unnecessary to use silica, barytes or any other extender. In my own experience I have had white lead tinted with earth colors to last for seventeen years and still remain in good condition, and I do not believe you could get better results than that.

The Veteran Painter.

—1381—

Will the Addition of Whiting Injure White Lead and Oil Paints?

Whiting is simply chalk that has been washed free from grit and other earthy matters; it is simply carbonate of lime, and if mixed with linseed oil, the mixer will observe that the mixture is destitute of all the qualities needed in a paint. Its addition to the white lead paint causes the paint to work gritty, granular, flake off and become non-adherent, because the whiting has no affinity for the oil binder.

H. C. Standage.

—1382—

Quick Drying White Lead Paint.

Is shellac varnish the best quick drying medium for a paint to be used on bobbins or spools that are wanted at short notice, say in an hour or so? The inquirer found it hard to mix dry white lead with shellac so that it will cover well in one coat; it has to be thick, and does not work well.

There are other ways to apply white lead and have it dry hard in one hour, but a clean white cannot thus be obtained. Still, a good flake white (white lead) ground in a pale japan and thinned with pure spirits of turpentine will dry hard in one hour if not laid on too heavy. However, it is just possible that a combination of white lead and shellac is the very thing needed for the bobbins in

question, and we would suggest that you grind dry white lead in alcohol to a fairly thin paste, keep same in a jar well sealed, and whenever you require it, thin as much as you need at a time with white shellac varnish. You can use denatured alcohol in place of the pure spirits of wine. You will find that by following this suggestion you will obtain better results.

—1383—

Precautions Against Lead Poisoning.

A man who is a painter doesn't want to eat much breakfast, but he ought not to go to work on an empty stomach, as that is a good way to get painter's colic. If painters would only be more careful and not eat till they have washed their hands and not take a chew of tobacco with painty hands, there would be little danger of colic.

The Veteran Painter.

—1384—

How Dry White Lead Is Pulped and Ground in Linseed Oil.

When white lead corrosion has been accomplished and the coarser particles of uncorroded metallic lead have been removed in the separating apparatus, it is put through rollers and passed into screens that revolve under water, so as to prevent the raising of dust, and in this manner is freed from the finer particles of metallic or uncorroded lead, the so-called trailings, which are used in the manufacture of oxide of lead. Through an opening in the bottom of the tank, in which the second screening takes place, the white lead and water together pass into the hopper of a burr mill, which grinds the material to impalpable fineness and passes it into a series of floating tanks, the finest lead being carried to the farthest of the tanks, the coarser being deposited in the tanks nearest the mill.

In this way the lead becomes "pulped" and is run off or pumped into large tanks, when it is agitated by compressed air, allowed to settle and the clear water drawn off. Then more clear water is allowed to run into this tank, and the pulp stirred again and this process is repeated, until all traces of acetate of lead are eliminated by this so-called washing. The pulp is then either placed on drying pans for the production of dry white lead, which is afterward sold dry or mixed with linseed oil and ground on burr stone or roller mills, or it is allowed to run into long cylinder-shaped mixers in vertical position, that have a stirring device suited to the purpose. When this is in operation, the required quantity of pure linseed oil (no other oil will do it), is allowed to run in, and in a short time the lead and oil mix and unite in the bottom of mixer, leaving the clear water on top. After this water has been drawn off, a gate in the bottom of the mixer is opened and the lead and oil mixture run off into a cooler, where a trifle more oil is added, which expels the remaining water, that is also drawn off. Now the mixture is run through a mill, preferably a roller mill, and the product is finished. White lead in oil ground in this manner has been designated as "pulp ground lead," while that ground from the dry lead has been known as "dry ground." The latter may always be recognized by more or less clear oil being found on top in opening package, while separation of oil rarely takes place in the "pulp ground" article.

—1385—

Determining Specific Gravity of Dry White Lead.

A correspondent wrote:—Will you please favor me by explaining the difference in several dry lead carbonate samples as to their specific gravities? To illustrate my point:—A maker of rubber goods has procured samples of four different brands of dry white lead (here follow the names of the brands which we withhold for obvious reasons) and out of the four he selects one as meeting best his requirements it being more bulky, or of lighter gravity than the others. Taking the average specific gravity as 6.40 to 6.50, I find in my method that none

of the four samples come up to the recognized standard, I ask, whether my method is the proper one. It consists of using 25 c. c. bottles, weighing them, then bottles and lead, then filling them with distilled water at 20 degrees temperature and finally weighing bottle, lead and water, as per example:—

Bottle and lead equals.....	18.42
Tare of bottles equals.....	13.42
Lead equals.....	5.00
Bottle, lead and water, equals.....	25.00
Water equals	24.12
	.88

5.
——equals 5.68 specific gravity.
.88

Am I correct in this, and if not, will you advise how to proceed, as this specific gravity test is a new thought to me?

You are correct so far as we can see, at least your method is, unless you have erred some in your reading. At least one of the brands you mention will not show up with a specific gravity that comes very close to the actual average for that brand, which is the bulkiest white lead upon the market. There is a more simple practical test that the user of the dry lead might employ, which consists in having as many hydrometer jars, graduated in c. c. An equal number of ounces of each sample is ground in a mortar with enough distilled water to produce a thin paste, which is still further liquefied with distilled water, then poured into the jar, taking care to remove every trace of lead from the mortar and adding enough water in each case to have the volume of liquid alike in each jar. The jars are permitted to remain undisturbed, the lead settling, the clear water coming to the surface and after twenty-four hours it is safe to read the number of c.c. to which the lead reaches and the higher the mark the more bulky the sample of white lead.

—1386—

Will Pure White Lead Mixed in Oil Keep for Any Length of Time?

Answer:—When pure white lead in oil that is ground from basic lead carbonate which is free from metallic lead and other impurities is well mixed with pure well settled raw linseed oil and a minimum of good oil and turps drier that does not contain rosin or gum and is put up in sealed tin cans, the paint on opening the package will show no sign of fattiness of the oil, but it will be found to have separated to some extent, the heavy portion being in the bottom of the package in more or less compact form and it will require more or less elbow grease to bring the paint to uniform consistency. This will not happen until the cans have set undisturbed for from four to six weeks, but even then the settled portion will be fairly soft. After from six months to, say one year, there is liable to be a rather hard sediment that is difficult to dislodge from bottom of can, especially on the edge. White lead paint becomes what we term fatty only on standing about exposed to the air, but when in hermetically sealed tin packages there will be no such action.

LINSEED AND OTHER OILS.

—1387—

Boiling Linseed Oil in Small Quantities.

A painter in Maine says that boiled linseed oil is not generally sold at retail paint stores and yet a little good boiled oil is sometimes needed and of better service than raw oil and driers, and asked for instructions to prepare it in a small way, a gallon or so at a time.

We would say that you will find it to better advantage to purchase your boiled oil in five gallon lots, keeping it well corked up to exclude air. Your dealer can procure for you pure kettle boiled linseed oil from the manufacturer at a slight advance over the price of raw linseed oil, and you need not risk a conflagration on your premises. You can specify whether it is to be lead boiled or manganese boiled oil, and if obtained from a reputable house, you need not be suspicious of spurious oil. However, if you desire to make the experiment, we would suggest that you get an iron kettle, if possible, glazed or enameled inside, of 2 or 4 gallons' capacity, with a round bottom and short legs, open at top, with a cover to fit and a bail or swinging handle. Put into this kettle enough oil to half fill it, and set on a good coal or coke fire and when the oil comes to a slow boil, put in slowly, while stirring with an iron spoon or rod 6 ounces of powdered litharge for each gallon of oil and bring the oil to a foaming boil, keeping on stirring until the litharge appears to be well taken up in the oil. As it would not pay you to purchase a high priced thermometer, you can test the temperature of the oil by holding a white feather over the boiling oil and when the fuzz curls and is singed by the heat, the fire should be permitted to go down, and the oil allowed to simmer on for an hour or two. It is then sufficiently boiled, but if you wish to body up the oil, you can fire up once more and bring the oil to a second boil for about fifteen minutes. then take it from the fire and allow it to cool. This is a lead-boiled oil which dries rather more slowly than the manganese-boiled oil, but makes a much tougher paint. To prepare the manganese-boiled oil, proceed in the same manner, but instead of using 6 ounces of litharge to the gallon, use 2 ounces of pulverized oxide of manganese. This oil is more of a surface drier and should be used only in paint of thin consistency, while lead-boiled oil is preferable for stout paint.

—1388—

When Should Boiled Linseed Oil Be Used in Preference to Raw?

Whenever the painter is uncertain whether his boiled linseed oil is pure kettle boiled or not, he had best depend upon the use of raw oil, adding the necessary portion of drying japan to insure the drying of the paint at the proper time. If, however, he is convinced that his boiled oil is the pure article, prepared on the fire instead of by the bunghole method, then we should suggest its use for painting metal such as tin roofs, iron awnings, spouts, gutters, etc., and employ it in finishing coats on wooden surfaces, wherever a good gloss is desired. Especially when a small portion of varnish is to be added to oil paint, it is best to have it mixed with boiled oil, because many varnishes will not mix well with raw oil or cause a loss of gloss. But wherever linseed oil is employed for priming raw wood on exposed surfaces or when red lead is mixed for priming iron surfaces, boiled oil should not be thought of and none other but pure raw linseed oil employed. The priming or first coating of exposed surfaces with paints containing boiled linseed oil or other than raw linseed oil has been the cause of the numerous instances noticed all over the country where apparently fine looking paint surfaces have scaled of late years.

—1389—

Driers and Temperature Required for Pale Boiled Oil.

Pale boiled linseed oil is best prepared in a steam jacketed kettle or tank, but it can be prepared also by fire boiling. In the latter case the temperature need not exceed 400 to 420 degrees F. The driers may be introduced in granulated powder form, but must be constantly stirred to keep from burning or adhering to sides of kettle. In boiling the oil in a steam jacketed kettle or tank the driers must be introduced in liquid form. The liquid driers may be prepared as will best suit the kind of oil wanted by using borate of manganese alone or with sugar of lead alone or with manganese sulphate, zinc sulphate and sugar of lead or the latter and manganese borate.

The driers are usually made for this purpose by heating, say five gallons of oil and introducing either of the following which will be sufficient for 300 gallons of oil:—

1.—Five pounds manganese borate, 10 pounds white sugar of lead, 5 pounds zinc sulphate.

2.—Seven and a half pounds manganese borate, 7½ pounds sulphate, 5 pounds white sugar of lead.

3.—Eight pounds of manganese borate.

The oil is heated to 250 degrees F., the driers sprinkled in, constantly stirred and heat raised to 450 degrees F., boiling for three hours.

In fire boiling the driers are sprinkled in the kettle, when the oil has a temperature of 230 degrees F. or thereabouts and the heat is gradually raised from 400 degrees to 420 degrees F. for at least three hours.

—1390—

Testing Raw Linseed Oil for Purity.

This can be determined by the taste and smell. Pure linseed oil has a slightly bitter taste and creates a rasping sensation on the tongue, but is not nauseating unless adulterated with fish oil, rosin oil or mineral oil. A few drops placed between the palms of both hands and rubbed briskly will cause the oil to heat and if adulterated, the odor will reveal the presence of fish oil, rosin oil or mineral oil. Pure raw linseed oil brushed over a piece of glass in thin film, will dry in less than 7 days.

—1391—

What Is Standol?

Standol as it is termed by German painters is known here as oxidized linseed oil, prepared by long continued boiling without drying mediums until the oil assumes the consistency of heavy syrup. This oil contains large percentages of anhydride linoleic acid, because its percentage of glycerine and fatty acids are very much reduced in the boiling process. This accounts for the greater durability of this material as compared with ordinary linseed oil raw or boiled. When the painter or paint maker uses oil of this character, he must not use other linseed oil to bring his material to flowing consistency, but use turpentine instead, and he will still have ample gloss in the paint. In the boiling process all moisture that may be combined with the raw linseed oil is expelled, and therefore this oil is miscible with any pigment. It is said that in some cases, when this heavy oil is mixed with zinc oxide, the mixture keeps on thickening, no matter how much turpentine may be added, but it will be found that this is either due to moist zinc oxide or to the oil having been impure in the first place. Most of the large linseed oil crushers, who sell refined or boiled linseed oil, as well as raw linseed oil, are prepared to furnish the thickened or boiled oil in various consistencies at a moderate advance in price over that of the ordinary boiled oil, with or without driers.

—1392—

Where Standol May Be Obtained.

The inquirer had become acquainted with the uses and the value of the material which German painters term standol through traveling in Germany some years ago. He had tried to locate it in this country for use in his own business, inquiring personally of many oil dealers in New York city, but no one knew of the article. Finally he found one party who knew the article, but was unable to supply it, as the firm did not have it.

The term standol apparently was taken from its original method of preparation by the painters themselves, meaning long standing in vessels without admission of air to prevent its becoming fatty. The oil was first boiled at low heat repeatedly, until it became thick and was then bottled and stood away for future use. In modern practice it is boiled in steam jacketed kettles, while a jet of air is blown through the boiling oil. By writing to the leading linseed oil crushers for prices on boiled linseed oil with and without driers you can obtain what you require, but as a matter of course, you will find the price considerably higher than that of ordinary boiled linseed oil, as there is considerable shrinkage in quantity and also some expense of treating to be figured in making prices.

—1393—

Linseed Oil Thickening on Exposure.

What is the cause for linseed oil thickening after standing in a can for a year, and is old linseed oil not better than fresh pressed oil?

Linseed oil thickens through absorption of oxygen, when exposed more or less to the air. It can also be thickened artificially by boiling with or without driers. If your can had been tightly sealed the oil would not have thickened perceptibly, it would have been clarified only by the settling of the foots, but so long as there is any opportunity for air coming in contact with the oil it was bound to become heavier in body. This is termed the process of oxidation. There is not any question but that raw linseed oil gains in value by long settling, so long as it is not directly exposed to the air and becomes rancid. Well settled raw linseed oil will make paint much more durable than fresh pressed raw oil or boiled linseed oil.

—1394—

Calcutta Linseed Oil Compared with Baltic and American Linseed Oils.

The term "Calcutta" indicates, or at least should indicate, that oil is made from seed imported from the East Indies, the principal port of export being Calcutta. The flax plant, from which the linseed (also known as flaxseed) is obtained is a native of Eastern Asia and was known to earliest history. From there it appears to have found its way into Africa and Europe, and finally into America. The plant, as it is cultivated in Ireland, England, Belgium, Germany and Austria and some parts of France, yields the best fiber, but the oil from the seed is inferior to that produced from East India, Archangel, Baltic, Black Sea and Sicilian, as well as to the American seed. The United States of America and the Argentine Republic furnish about one-third of the entire world's product of linseed, and the seed from these sources is superior to that from many others, because here the plant is grown for the seed alone, and the latter permitted to ripen, while in other locations the plant is raised for its fiber and the seed does not ripen as early as the fiber is ready for cutting. Russia furnishes another third of linseed for oil production, the East Indies about one-sixth, the remaining one-sixth is furnished by the other countries named. East India or Calcutta linseed finds its way into English, German, Belgian and Dutch ports, and is distributed to oil crushers in the countries named. Some of the seed is imported

into the United States, but the quantities are quite small, as compared with those handled twenty-five or thirty years ago, before the linseed producing Western States were cultivated as they now are. It is asserted that in India, which is very prolific in oil bearing seeds, such as mustard and other acrid seeds, these are freely used to adulterate linseed to the admitted extent of 15 per cent., probably more. In the Baltic linseed there is an admixture of hempseed and rapeseed present, as a rule, and while the former is a siccative or drying oil bearing seed, the latter is not. So far it is pretty certain that today the American linseed produces the purest drying oil, no matter what has been the case years ago, and we think that the foible of old line painters for "Calcutta" oil should be on par with the preference for "English" white lead by some of the older painters.

Calcutta boiled linseed oil should be well aged raw linseed oil expressed by the cold process from East India linseed, well settled, then boiled with the addition of such driers as red lead, litharge or manganese salt in a kettle over a fire at such a temperature and for such length of time as is required to give the oil additional body and drying properties by expelling moisture and other impurities and absorption of oxygen. But how is the painter to know that in this boiled oil the Calcutta article has been really introduced? Assuming that he can recognize raw Calcutta oil, how can he, after the oil has undergone such a decided change as takes place in the firing process, say whether it is East India, Baltic, Sicilian or American seed oil? He must of necessity depend upon the veracity of the producer or his agent. Let us see why we boil linseed oil and what occurs in the process and what is the advantage of the boiled article over the raw. Linseed oil is boiled, first because there is a demand for the article. Some fifty years ago the painter boiled his oil in order to obtain a higher luster for his paints and also to give the oil increased siccative or drying properties. Today the oil crusher saves him the trouble. He puts into a kettle containing, say, ten gallons of raw linseed oil, say, four pounds each of red lead and litharge or eight pounds of litharge alone, heats the oil up to as high as 540 to 480 degrees F. until all of the lead oxides are dissolved, and while still hot this preparation is put into another kettle, in which ninety-gallons of raw oil have been heated to at least 320 degrees F., and all are stirred together and fired for a little while, until a temperature of at least 380 degrees F. is reached. The resulting product is boiled oil that contains one per cent by weight of oxide of lead, is of higher specific gravity than raw oil, dries free of tack when flowed on a pane of glass that has been placed on a vertical position, inside of twenty-four hours, without the addition of extra drier, produces high luster when used as a thinner for oil colors, but is not as durable as would be the raw linseed oil from which it is prepared were the latter used in its place and without the addition of drier. Calcutta boiled linseed oil is not one whit better than American boiled linseed oil, assuming that both are fire or kettle boiled by the same process. "Double boiled" should actually mean that the oil was boiled twice, allowing it to cool after the first boiling, then firing it again, but for many unscrupulous dealers it means that they must put twice the usual quantity of lightning drier into the barrel by the bunghole in place of the usual amount that is used for the commercial boiled oil. Our advice is, do not worry whether the boiled oil is named Calcutta or simply kettle boiled linseed oil, but buy it from a reliable crusher or manufacturer.

—1395—

How to Thin Down Boiled Linseed Oil That Has Thickened by Age.

A painter desired to know how to reduce boiled oil that has thickened in storage to proper working consistency. Has tried it by bringing to a boil in a kettle but was unsuccessful.

It strikes us that your boiled oil consisted of the so-called "bunghole" variety and that the thickening was caused by the evaporation of the volatile portion of the lightning drier, which originally took the place of kettle boiling.

However, whether "bunghole" boiled or "kettle" boiled, you can thin the oil by adding gradually, while working it, small portions of turpentine or deodorized benzine, until it attains its original fluidity and then use it for mixing paint without fear of detriment to the gloss, but be careful to avoid using it in priming new wood. If it does not work freely after cutting with turps or benzine, add enough raw linseed oil.

When boiled oil that has become too thick for use practically, you had better mix a little raw oil with it and use it for painting tin roofs. It is good for nothing else, but it is the best kind of oil to use for that purpose. Any linseed oil that has become thick from the absorption of oxygen never will dry hard.

The Veteran Painter.

—1396—

Substitute for Raw Linseed Oil.

"Substitutes" are useful only for rough work and should never on any account be used for first class or decorative work. Ingredients:—Twenty-eight pounds rosin, $1\frac{1}{2}$ pounds quicklime, 5 gallons Russian petroleum, 1 gallon rosin oil, $\frac{1}{2}$ gallon linseed oil, 3 pints liquid drier. Dissolve the rosin in the petroleum and mix in the rosin oil, linseed oil and drier in the order named. Separately mix the lime with the water and add this to the rosin mixture, constantly stirring, and keep warm until the lime precipitates. Then run off the clear oil into tank to settle, and when clear, put in bottles or cans for use.

H. C. Standage.

—1397—

Substitute for Boiled Linseed Oil.

This compound can be used as a drying oil or cheap varnish. Ingredients:—Forty pounds rosin, ground; $2\frac{1}{2}$ pounds quicklime, $2\frac{1}{2}$ pounds white copperas (sulphate of zinc); $6\frac{3}{4}$ gallons Russian petroleum, 1 gallon rosin oil, $2\frac{1}{2}$ quarts water. Melt the rosin in the petroleum and add the other liquids. Mix the lime with half the water and the zinc sulphate in the remainder, then add lime to the oil mixture. Stir well and add the zinc solution. Keep the mixture warm and constantly stir until the sulphate of calcium that is formed precipitates; then run off and settle.

H. C. Standage.

—1398—

Freezing of Linseed Oil.

Does linseed oil really freeze and at what degree below zero?

You must not expect oils or fats to become hard or solid like water on freezing. The term freezing, as applied to these substances, may not be the proper one; but all the same, it is the most practical one to apply. While congealing is the technical term best adapted to convey the state or condition of the oil when subjected to exposure in very low temperature, we should say that the use of the word freezing is permissible. To determine the real degree of temperature you should have inserted the point or bulb of the thermometer into the congealed oil and you might have found that the oil was not as cold as the air surrounding it. Scientists consider linseed oil frozen when 18 degrees below zero are indicated by a thermometer that has been inserted therein.

—1399—

Corn Oil in Paint Compared with Linseed Oil.

Corn oil is obtained as a by-product in the manufacture of glucose and starch from maize. It is practically non-drying, though when exposed to the weather for a month or so it forms a sort of crust. It has not the body or tenacity of linseed oil and a paint that contains corn oil and dryer only for its liquid or vehicle, is liable to become soft in frequent rains and to be washed down in driving rainstorms. Raw corn oil is readily recognized by its sweet odor which becomes more pronounced when it is heated.

Many importers and dealers in oil and naval stores sell palm oil. It is also known as palm butter, and under its Latin name. *Oleum Palme*. It is obtained from the fruits of several species of palm, chiefly of *Elaeis guineensis*. The nuts after separation from the spadices containing them are allowed to decompose somewhat in the open air. The pulp is detached from the hard nuts mixed with water and heated, when the oil is pressed out. Fresh palm oil has an orange yellow color, a sweet taste, and an odor somewhat like violets or orris root. It is thick like soft butter or lard, and is mostly used to coat tinplate to keep it from rusting during transportation, but is a non-drying oil.

—1400—

The Composition of Gloss Oil and Its Uses.

Gloss oil is a term largely applied in the South and West to a mixture of ordinary rosin and benzine. Its manufacture is very simple and it may be done in the cold way by powdering the rosin and stirring it into the benzine (or naphtha, as many are wont to call it), until it is dissolved, or the rosin may be melted in a kettle over a fire, then removed to a safe distance and the benzine poured into the kettle, under continued stirring. This rosin and benzine varnish or gloss oil is mostly employed for thinning very cheap paints, such as are used for coating barrels and other work where quick drying is required, but durability not looked for. It could be employed for sizing walls, but we should not advise you to use it because it is almost too brittle and you had better not depend on its use as a wood filler, even for very cheap work. For these purposes you should have a varnish that is prepared with a fair percentage of linseed oil, even if it should contain rosin and benzine as its other constituents.

—1401—

Quantity of Linseed Oil Required to Grind Various Pigments Into Paste.

In the following we give the average quantity in pounds of oil required, when the materials named are bone dry and in finely powdered state:—

Materials.	Lbs.	Materials.	Lbs.
White lead	9	Chinese blue	105
Zinc white	20	Ultramarine blue	40
China clay	35	Imit. Cobalt blue	45
Terra alba	26	Genuine cobalt blue	85
Whiting, bolted	23	Chrome yellow, light	25
Blanc fixe	15	Chrome yellow, medium	30
Barytes	8	Chrome yellow, dark	26
Silica	32	French carmine, No 40.....	75
Lithopone	13	Verdigris	50
Yellow ocher	34	Bone black	100
American ocher	30	Lampblack	250
Burnt ocher	32	Gas black	420
Raw Ital. sienna	110	Mineral black	90
Burnt Ital. sienna	90	Drop black	125
Red oxide	28	Vegetable black	150
Venetian red	26	Mineral brown	28
Indian red	22	Terra verte	80
Tuscan red	28	Viridian	90
Raw Turkey umber	100	C. P. chrome green, L.....	30
Burnt Turkey umber	85	C. P. chrome green, D.....	35
Vandyke brown	115	Comm'l chrome green, L.....	18
Bitumen	125	Comm'l chrome green, D.....	20
Brown madder	100	English vermilion	16
Red madder	120	American vermilion	18
Prussian blue	100	Emerald green	37

With the exception of the chrome greens with the prefix Comm'l, the colors named are chemically pure, and the quantities of oil indicated are such as are actually required in practice and not copied from text-books.

—1402—

A Simple Method for the Detection of Mineral Oil in Linseed Oil.

Keep in your shop a strip of clear window glass, say about 3 by 8 inches, coated on one side with several coats of lampblack; also keep in a well-stoppered bottle a sample of raw linseed oil that is unquestionably pure. Keep the oil in a dark place, so as to hold its original color; otherwise it will bleach from the effect of strong light. Place a few drops of the suspected oil on the unpainted side of the glass, and alongside of that a few drops of the pure oil, and if the suspected article contains only 5 per cent. of mineral oil it will be plainly noted by the bluish cast (usually termed bloom) of the specimen. Your suspected oil may contain a good portion of cottonseed oil, which at present is somewhat lower in price than linseed. To test for the presence of cottonseed oil, make a freezing mixture of ice and salt, and insert into this a small bottle or test tube containing some of the suspected oil. Linseed oil freezes only at a temperature of 18 deg. F. below zero, while cottonseed oil freezes at 28 deg. above zero. When the suspected article, after remaining in the freezing mixture for thirty minutes, assumes butterlike consistency it is either all or nearly all cottonseed oil, if only somewhat coagulated the percentage of cottonseed oil is probably one-third or one-half, but if the oil is unaffected and merely becomes cloudy it may be pure linseed oil containing a very small percentage of moisture. Fish oil also freezes very readily at 30 deg. F. above zero, but its presence is easily detected by its odor. At all events, you should view with suspicion any linseed oil that is offered you below current market rates.

—1403—

Refining and Bleaching Raw Linseed Oil for Use in Grinding White Lead.

We do not know of any process that will bleach linseed oil white unless by a very slow method, which takes too long to admit of using it in manufacturing on a large scale. This is bleaching by sunlight, and is all right for the purposes of the artist or small painter. The bleaching process by the use of chlorines is not a safe one, as the bleached oil cannot be freed entirely from the chemical. Pure white lead acts itself as a bleaching agent on the oil; when air is admitted and when white lead is ground in raw linseed oil and thinned with raw oil for exterior work, it will, although of a creamy yellow color on first application, bleach out white in a very few weeks. For interior work, of course, it is best to have the lead ground in refined or bleached oil, especially where the work is to dry flat. But even here it is not necessary to have the oil water white, it being sufficient, when the oil has had all albuminous and mucilaginous matter removed by refining and has assumed a very pale greenish or yellowish color. This stage can be attained in a large way by the sulphuric acid treatment. Be it remembered, however, that only the pressed oils can be thus treated with success; extracted oils are too light in body to be decolorized by such a method. These will become darker and redder in contact with acid.

The apparatus necessary to refine oil consists of two oblong wooden boxes, which are set on top of one another, that on top being about one foot shorter than the other, both of sufficient width and depth to hold a given quantity of oil. They must be lined inside with sheet lead all over, bottom and sides, and the bottom of each is to be triangular in shape, in the center of which is a perforated lead pipe for the purpose of agitating the oil in the top box and of washing the treated oil in the bottom box with steam. Over the top box runs a perforated lead pipe coil, with a leaden funnel attached. There are spigots attached to the boxes,

the one in the top box for the purpose of draining the treated oil into the bottom box and two spigots in the bottom box, one about a foot above the bottom, to draw off the clear, refined oil, and one at the bottom to draw off the water from the condensed steam which has collected in the bottom of the box. The top box is termed the treating tank, the lower one the washing tank.

The treatment consists of the following: Well settled raw linseed oil is placed into the treating tank to within a foot of the top, and the oil agitated by compressed air, supplied from a rotary pump or otherwise, and sulphuric acid of 66 deg. Beaume (oil of vitrol), slowly distributed over the surface of the oil so that no charring can take place, by means of the perforated lead pipe, the acid being poured into the leaden funnel. One pound of acid is generally sufficient for every 100 pounds of oil, and when all the acid is distributed the agitation is kept up for from six to eight hours. After resting for twelve hours, the scum is removed and the oil tested, which should have a greenish color, in an ordinary test tube. Now the oil so treated is run off into the washing tank and the steam turned on, so as to agitate the oil with moderate violence. This should be continued for a whole day and the scum forming on top removed from time to time. The steam is turned off in the evening and the oil allowed to rest during the night. Next morning steam is started again and continued for another day. Now the oil is tested for remaining traces of acid by means of litmus paper, and, if traces of acid are still found, the water is drawn off through the bottom spigot, and steaming resorted to again. To neutralize any remaining traces of acid, a small quantity of lime water is put into the washing tank during the last steaming. The oil is now pale, but still turbid, and before use should be drawn off into settling tanks that are open at the top to admit light and air, when the oil will be clear and fairly well bleached inside of ten days.

—1404—

Amount of Linseed Oil and White Lead Required for Gallon of Paint.

Wanted, the amount of white lead and linseed oil to mix up a gallon of paint for priming and for second and third coats.

Priming White Lead.—To make one gallon for this purpose will require 15 lbs. pure white lead in oil and 4 lbs. pure raw oil and $\frac{1}{4}$ gal. japan.

Second Coat White Lead.—One gallon will require 16 lbs. pure white lead in oil and $3\frac{3}{4}$ lbs. pure linseed oil and $\frac{1}{4}$ gal. japan.

Finishing Coat White Lead.—One gallon will require 17 lbs. pure white lead in oil and $3\frac{1}{2}$ lbs. pure linseed oil and 3-16 gal. japan.

It is a question what is the proper proportion for the various kinds of wood, soft woods requiring more thinners than hard woods.

—1405—

Is the Quality of Linseed Oil Impaired When Exposed to Freezing Temperatures?

Yes, temporarily, but not permanently. The point at which pure linseed oil freezes is minus 27.5 deg. C.—18 deg. below zero F. It is apt to become turbid, however, when exposed to a temperature below the freezing point of water, viz., 32 deg. F. In any state between this point and that of its own freezing point, linseed oil, raw or boiled, is not in good condition to be used as a thinner for paint, and should not be so employed without being warmed up to a temperature of between 60 and 75 deg. F., otherwise it will not mix well and make the paint appear seedy or grainy.

Even if the oil has become congealed by frigid temperatures it has lost none of its valuable properties when warmed up to a normal temperature, so long as it was pure and fairly free from foots and moisture originally.

—1406—

What Is Meant by the Term "Drying Oil?"

The term drying oil stands simply for such oils as will dry and harden, or, in other words, form a film or skin on exposure to the air. The most important among them are linseed oil, poppy-seed oil and nut oil from walnuts.

—1407—

Raw Linseed Oil vs. Boiled Oil for Wagon Painting.

We see no objection to using raw linseed oil in place of boiled oil in wagon work; on the contrary, we think the wearing quality of the paint will be increased by the use of pure, well settled raw linseed oil, when we consider that the boiling of oil with driers changes the medium into a varnish that no longer has the qualities of the crude article, and also in view of the fact that much of the commercial boiled oil is nothing more than raw oil doctored up with cheap driers, and has never been near a fire. For wagon work, we should say that seven and one-half pints of raw oil and one-half pint of a first-class liquid (oil) drier would be about the proper proportion for summer and seven pints raw oil and one pint liquid drier for winter, drying as well as boiled oil, to which little or no drier is added.

—1408—

Substitutes for Linseed Oil and Their Value.

We are sorry to say that we cannot tell you of a good substitute for linseed oil, as we should be very glad ourselves to find or know of something that would actually take the place of that paint medium, and yet cost us only one-half or one-third as much.

The fact is that the oils that are as good and in some respects better than linseed oil cost as much or more than the latter, while some of the practically non-drying oils that are cheaper at first cost and might be substituted require more drier, costing as much in the end, besides being deteriorated still more by the use of so much driers. By using cheap oil you may be successful in securing contracts for a time, thereby undermining the existence of your brethren in the craft, but unless you wish to go out of business at an early date, or desire to be looked upon with disdain, you had better think twice before basing your estimates on the use of rosin oil, petroleum or japan oils and the like.

We are opposed to the use of all nostrums, and cannot give you any information on the composition or pass any opinion on the comparative value of the paint oils you name. The very best way for you to determine their value is to make tests of them in comparison with pure raw linseed oil, using the same base or paste with all of them, applying a similar number of coats to raw wood, giving the test boards a severe exposure. It will not require many months to tell the tale, and convince you that in order to sustain reputation in business honesty is the best policy, and honest linseed oil the best paint oil.

—1409—

Capacity of Containers and Odor of Boiled Linseed Oil.

The best way to find out whether a can holds five gallons of oil is to measure the contents of the can in a United States standard gallon measure. Or you can weigh the full can, note the gross weight, place the oil in another receptacle and drain the can, then weigh it and after subtracting the tare from the gross weight, divide the remainder by $7\frac{3}{4}$, and the result will be the number of gallons contained in the can, as linseed oil actually weighs $7\frac{3}{4}$ pounds, when temperature is 59 deg. Fahrenheit, although commercial usage figures raw lin-

seed oil at $7\frac{1}{2}$ pounds per gallon. The average contents of a barrel of linseed oil is fifty gallons, but for the market linseed oil is filled into barrels holding anywhere from forty-seven to fifty-three gallons, the gross and tare weight, and sometimes even the net weight marked on each barrel. But the oil is sold at $7\frac{1}{2}$ pounds per gallon. Assuming that a barrel of linseed oil contains 382 pounds net, the consumer is billed with 50 14-15 gallons of oil at such and such a price per gallon, although he actually receives only 49 29-100 gallons. Such is the custom of trade, and the consumer must make allowance for the discrepancy.

Fire-boiled or kettle boiled linseed oil will smell somewhat fishy, when oxide of manganese has been used as drier in boiling. When lead oxides, such as litharge or red lead, have been employed there is no fishy odor, but an odor similar to that of leather, and when sugar of lead has been used the odor is slightly acid.

But according to a report of a prominent chemist in a master painters' convention on the analysis of quite a number of samples of boiled linseed oil, there was only one fire-boiled oil out of eighteen or twenty samples, the boiling of the balance having apparently consisted of simply heating the oil to a certain degree of temperature, adding various driers, principally consisting of rosin, lead or manganese salts, rosin oil and petroleum products. The odor of such boiled linseed oil, if they may be so called, depend upon the grade of the drier, but they are not pure boiled linseed oils in the strict sense of the term.

—1410—

Neutral Oil as a Paint and Putty Oil.

What "neutral oil" is, from what it is derived and what uses it may be put to:—

So far as we know, "neutral oil" as known to the trade is classified mineral oil or petroleum, from which paraffine, vaseline, etc., have been extracted or removed by a process or processes best known to the refiners of petroleum. It is usually nearly as light in gravity as kerosene of 150 degrees test, but is more lubricating and may be obtained somewhat heavier in specific gravity. It is largely used in connection with linseed oil or alone in the manufacture of commercial putty and in low grades of mixed paints simply as a cheapener for these goods, wherever there is a demand for them. It does not dry by oxidation, like linseed and other drying oils, nor has it the faculty of producing as tough a film, and from the fact that an excess of driers must be employed to harden the paint made with it as part of the vehicle, it yields early to decay when exposed to the elements. If used in glazier's putty it is very apt to make the material crumble, or if well protected by paint, such putty is liable to throw off the paint from its blowing out tendency. When used in exterior house paints, which may be subjected to driving rainstorms, such paints will invariably come to grief at an early day. Our advice to reputable painters is to leave it out of their paints, even on cheap work, and not to purchase paints or colors containing neutral oil.

—1411—

Substitutes for Linseed Oil in Paint.

We have known painters to use kerosene oil for thinning paint, also rosin oil and the heavier mineral oils, but have never heard of any painter using these in place of linseed oil to the entire exclusion of the latter. Cottonseed oil and corn oil have been used along with linseed oil by paint makers, and large quantities of soya bean oil are now being used, but we doubt that these have found their way to the painters, excepting as cheapness in linseed oil at times, when these oils were lower in prices than the latter.

—1412—

Flaxseed and Its Products.

When oil was expressed from the seed in the cold way, the maximum quantity of oil from a bushel (averaging 52½ pounds) of seed did not exceed 22 per cent. by weight, or 11¼ pounds, equal to 1½ gallons of oil, commercially sold at 7½ pounds to the gallon. The residue or meal cake was a highly nutritious food for cattle, retaining from 8 to 10 per cent. of oil, along with albuminous and cellulose substances. This was the case when the pressing of linseed had not assumed its present volume.

With the advent of the powerful hydraulic presses, the yield averaged as much as 26 per cent. of oil, or 13⅝ pounds per bushel, or 1 4-5 gallons. The hot process of pressing linseed oil yields from 27 to 28 per cent. of oil or about 14½ pounds, or 1 14-15 commercial gallons. The residue or meal cake from the hot process of pressing linseed oil yields from 27 to 28 per cent. of oil or about pressed article. The percolation method of extracting oil from flaxseed used to yield 33 per cent. of oil from the bushel of seed or 17 1-3 pounds, equal to 2 1-3 commercial gallons. The meal cake was worthless for feed and was used for fertilizing. This process, it is understood, has been supplanted by the vacuum process of extraction, yielding as much as 37 per cent. of oil, equal to 19½ pounds or 2 6-10 commercial gallons. The meal, as in the percolation process, is, of course, unfit for cattle food, and used in the same manner for fertilizing.

Way's analyses of 33 samples of linseed from various countries show the following variations of constituents:—

Nitrogen	from	3.3	to	5.28	per cent.
Fat	from	34.70	to	38.42	per cent.
Ash	from	2.68	to	5.64	per cent.
Water	from	8.51	to	12.33	per cent.

Way's analyses of oil cake from above:—

Nitrogen	from	3.92	to	5.25	per cent.
Fat	from	6.60	to	15.32	per cent.
Ash	from	5.45	to	22.66	per cent.
Water	from	6.56	to	10.26	per cent.
Albuminous Matter	from	25.00	to	36.00	per cent.

—1413—

Deodorizing China Wood Oil with Essential Oils.

It has been so far impossible to deodorize raw China wood oil. By heating the oil to about 350 degrees F. some of the impurities in the oil are separated and the odor is then less marked, but the odor, which is very much like ham fat, is still present to some extent. When the oil is prepared for use in varnish it is heated, and inasmuch as only a certain percentage of it enters into a varnish, the balance, consisting of resin and solvents, with probably some linseed oil, the odor is reduced to a minimum.

However, in cases where it is desirable to mask the smell, a trifle of some cheap essential ail, like oil of spike, oil of citronella or oil of myrbane (nitrobenzol), will be effective and will not affect its drying or its use in any way, as they evaporate quite readily on the spreading of the oil or varnish.

—1414—

Formula for a Fair Grade of Gloss Oil.

Gloss oil, also known as rosin and benzine liquid, can be produced in various ways. The name is a misnomer, as usually there is no oil whatever present as such. It is simply a mechanical mixture of the ordinary pine tree rosin and petroleum naphtha (benzine). It is best made in an iron kettle by melting the rosin to the liquid state then removing kettle (on wheels) to a safe distance,

stirring in the benzine gradually. Four hundred pounds of rosin and fifty gallons 59 to 62 degrees benzine produce ninety gallons gloss oil when carefully handled to avoid waste. There is nothing added to give body, as addition of rosin oil or heavy petroleum would prevent the timely setting of the gloss oil.

—1415—

Soya Bean Oil. What Changes Occur in Boiling?

Up to the present time we have not heard of any boiled soya bean oil being offered to the trade, nor have we any reliable information as to the physical or chemical changes that may take place during the boiling process, but as soya bean oil is a vegetable oil most closely resembling linseed oil of any in the vegetable line, excepting poppy seed, walnut oil, hempseed oil and possibly sunflower seed oil, it is fair to assume that the changes occurring in the boiling of soya bean oil are very similar to those undergone by linseed oil, with one exception, which is that the bean oil has not the same power to absorb oxygen as linseed oil; in other words, it is unable to take up as much of the drying salts used in boiling under exactly similar conditions of temperature, time, etc.

We have not the space in these columns to go into a lengthy description of the changes that occur in the boiling of linseed oil and it is a well-known fact that boiled linseed oil will dry much more rapidly even when boiled without the addition of drying salts than will raw linseed oil. It is fair to assume that the drying of soya bean oil can be made more rapid when boiled than the raw article. Soya bean oil must be in the class of semi-drying oils, for if it could take the place of linseed oil in all respects its market price would not be nearly, if not one-third less, than that of linseed oil.

It is asked if linseed oil, raw or boiled, is improved by the addition of soya bean oil when used in paints for outside work. We should say it is not, because the addition of soya bean oil retards the drying of linseed oil, in consequence of which more drier must be added to have the paint dry within the usually expected time.

—1416—

Perilla Oil in Comparison with Linseed Oil.

It is still premature to give any definite information on the advantages of the use of perilla oil in the manufacture of varnish, inasmuch as the matter is still in the experimental stage. The reports so far received would show that the drying mediums dissolve more readily in this oil and that the oil so boiled dries much more rapidly and with greater absorption of oxygen than the boiled linseed oil of similar proportions. At the same time the boiled perilla oil is paler in color and dries harder and free from tack. Remarkable, however, is the fact that in the trials so far made it has been ascertained that with perilla oil not all of the drying mediums are alike useful, as they are with linseed oil. For instance, when a combination of resinate of lead and resinate of manganese is used as a dry powder in the boiling of perilla oil it does not dry uniformly smooth, but in streaks and blotches, while, when 70 parts of perilla oil and 30 parts linseed oil are boiled with the fused and melted resinate of lead and manganese, the resulting boiled oil dries in a uniformly smooth film. When boiled with siccatives of cobalt, however, perilla oil produces a very pale and rapid drying product, with higher luster and harder film than one made with similar proportions from linseed oil. Inasmuch as the experiments referred to have been only of three months' duration, there can be no conclusions as to the practical value of the tests or the durability of the products. The only statement that can be made with certainty is that applications of perilla oil, raw and boiled, and either mixed with pigment, have on a three months' exposure, side by side with similar coatings from linseed oil, stood well, apparently, and have proved more resistant to the influence of water. As for comparing perilla oil with China wood oil, we have no data on experiments made in that direction, nor do

we expect that the two oils will be found to prove in any way similar in character. In conclusion we may say that it will be quite some time before perilla oil will come largely into use, because of its scarcity and high price.

—1417—

Soya Bean Oil.

1. What is soya bean oil? 2. Can soya bean oil be mixed with linseed oil, 75 per cent. of the former and 25 per cent. of the latter, in a paint with lead base for outdoor work and give satisfactory results? 3. Will it make a durable roof stain when mixed with color? 4. What effect would it have if used as a priming on outside work?

Soya bean oil is a semi-drying vegetable oil extracted from the soja or soya bean, a plant cultivated largely in Manchuria, China, some varieties of which are also cultivated to some extent in the southern portion of the United States. While it was first imported into England and Germany and later into the United States for the exclusive use of soap manufacturers, the high price of linseed oil induced parties interested in paint manufacture to give the material a thorough trial, which resulted in largely increasing the demand. In our issue for November, 1911, on page 938, under the heading:—"The Paint Oil Problem," you will find the description of a painting test made with linseed oil paint in comparison with paint containing soya bean oil and with paints containing part linseed and part bean oils. The result of this test would tend to show that there is no great risk in mixing moderate portions of soya bean oil with linseed oil in paint for outdoor work, though a little more drier will be necessary if such paint must dry as rapidly as a straight linseed oil paint. We should say that when the base of a paint has been ground in linseed oil the limit to which bean oil can be used for reducing to brushing consistency for outdoor work should not exceed 50 per cent., or in other words, the thinning of the paste should be equal portions of linseed and soya bean oil. We would not care to place ourselves on record as suggesting the use of soya bean oil as a priming, or in a primer for raw or new wood, as we prefer raw linseed oil for that purpose. But we see no reason why it could not be used as a roof paint with color and prove durable, as roof paints are permitted to dry more slowly than those used for the sides of a house.

—1418—

Paint Oil or Linseed Oil Substitute.

In our opinion, no oil has yet been discovered that will take the universal place that linseed oil holds in the manufacture of paint and varnish. China wood oil is superior to linseed oil in one respect only, and that is the toughening characteristics it gives to linseed oil varnishes containing rosin. It cannot be used, and is not used, in place of linseed oil, but merely in addition to the latter in certain percentages. Even then it cannot be used in its raw state, but must undergo certain treatments first. Soya bean oil is a semi-drying oil, and while it may be used in conjunction with linseed oil, it does not, when used alone, produce as tough a film when eventually dry as does linseed oil. It lacks the power of absorbing oxygen from the air—that is, to such a large degree as is inherent in linseed oil. By the term mineral turpentine we would understand this to be one of the so-called substitute turpentines, the high flash point distillates of petroleum. While some of these evaporate nearly as rapidly as turpentine, thus not materially reducing the time of drying of interior wall paints, etc., they are very uncertain in oil paints for exterior use, and cannot always be depended upon for replacing spirits of turpentine.

—1419—

Blown Linseed Oil.

Blown linseed oil is a product that is richer in oxygen than raw linseed oil. By blowing air through a body of raw linseed oil that has been more or less warmed, it is thickened through oxidation, while the so-called bodied oils are thickened by polymerization at very high temperatures. It is not necessary to raise the oil to more than 250 degrees Fahrenheit, at which temperature it will rapidly thicken when air is blown through it for at least six hours. Oil of original specific gravity of .932 will have its specific gravity increased to .946 by that time and its saponification number will have risen from 186 to 192. The apparatus for the process may consist of a cylindrical tank, provided with a steam coil for heating the oil, and the air may be furnished by a pump through a rubber hose with pipe attachment that is perforated at sufficient length from the end. Or a steam-jacketed tank or kettle may be used to warm the oil and the blowing be done as in the other case. A stirring device is not necessary, and in many cases the oil is not even warmed above ordinary temperature, excepting during the winter season. Still heating the oil somewhat will facilitate the process. As to the advantage of blown oil over raw linseed oil it may be stated that on account of its high oxidation it is fully equal in drying for exterior painting to boiled linseed oil that has been boiled with drying salts, such as litharge or oxide of manganese, and is said to be more durable, not having undergone the disintegrating process that some authorities claim takes place in boiling oil at high temperatures. When it is considered that many brands of boiled linseed oil are simply raw oil heated at low temperature and then mixed with some liquid driers, it stands to reason that this blown oil should prove superior in point of durability. As against bodied oil, this blown oil has the advantage that it may be used in mixing paint the same as ordinary boiled oil, while the former cannot be spread without very much reduction with volatile spirit.

—1420—

Rosin Oil.

First run or pale rosin oil is of light color with bluish cast (or bloom) and of moderate viscosity.

Second run or blue rosin is of dark color with decided bluish bloom.

Third run or green rosin oil is very viscid and of heavy body, more greenish than bluish and very dark.

Rosin oil of the so-called first run is most suitable for refining. For this purpose direct steam is used for boiling, hot water for washing, soda lye for purification; then it is boiled and washed again. When still further treated by heating with indirect steam and the passing through it of a warm air current, by means of a blower, it is known as blown rosin oil and is suitable for making varnish and lacquers, because free from acid resins.

The bloom or fluorescence noted in crude rosin oil is absent to a greater or lesser degree in the refined oils.

The specific gravity in the crude oil ranges from .996 in the first run oil to 1.030 in the third run, while that of the refined oil ranges .980 to .992, and the flash point of any rosin oil should not be much below 320 degrees Fahrenheit, while the fire point should not be below 386 degrees Fahrenheit.

There are no standards for the chemical analysis or specifications for the different runs of rosin oil other than those that may be obtained by examining the various grades sold.

—1421—

Bleaching Linseed Oil Without the Aid of Acids.

The views of practical men vary to some extent as to whether linseed or any other vegetable oil can really be decolorized by either method, although the

oils may be clarified or made paler in color by either of the two agents. But no one questions the fact that the use of fuller's earth is least expensive. We have good reasons to believe, however, that where either method has failed of its purpose it was due to the condition of the decolorizing agent and probably to the condition of the oil also. When bone black is used the material should be in granulated and not in finely pulverized form, and should be freshly calcined or at least heated before being mixed with the oil, which should also be as free from moisture as possible and at least 10 per cent. by weight of the oil should be used of boneblack. It is best to heat the oil to from 250 to 275 degrees Fahrenheit by means of a steam coil in a container with a mechanical stirring device for an hour or so to expel any moisture from the oil; then, while the stirring device is set in motion, the steam is turned off and the boneblack introduced. The stirring need not be continued steadily, but is best repeated several times, for thirty minutes at a time, for at least half a day. When the oil has become cold it is allowed to rest and settle, after which it is best put through a filter press, or when such an apparatus is not available through a filter bag. When the oil, after coming from the filter, is still turbid, it should be returned until it runs clear.

The better method, however, is by the use of fuller's earth, that mined in Florida being best; but here, too, the only way to succeed is in having both the earth (which is, chemically speaking, a hydrosilicate of alumina and magnesia) as free from moisture as possible. The same apparatus that has been mentioned for the bleaching with boneblack will serve the purpose here also, and the oil in this case may be gradually heated to 250 degrees Fahrenheit after the fuller's earth, to the extent of at least 10 per cent. of the total weight of oil has been stirred in, taking care, however, that the earth has first been dried at a temperature of not less than 212 degrees Fahrenheit to free it from moisture. When the mixture has been tested to 250 degrees Fahrenheit and kept at this temperature for two or three hours, occasionally stirring, it is allowed to cool, settled and filtered as described in the case of bleaching with boneblack. The finer the fuller's earth the better the bleaching power, but the more difficult the settling and filtering.

The sediment of the bleaching with boneblack can be utilized by grinding same fine in a stone mill for a black paint that will be serviceable in many ways, while the sediment from bleaching with fuller's earth can be washed out with benzine, the thinners and oil utilized in the making of cheap paint and the earth dried, re-roasted and used over again, or the sediment (earth and oil) ground through a mill and used as a filler in low-priced barn and roof paints, together with oxide of iron.

—1422—

Manufacture of Heavy-Bodied Linseed Oil.

There are any number of methods by which this may be accomplished. A very good method is by means of an apparatus consisting of a steam-jacketed kettle, with tight-fitting cover, that is provided with a stirring device and a coil that is perforated and connected with an air pump. The raw linseed oil is heated to not over 250 deg. F. and the air turned on, being careful not to have too strong a current, and while the air is being blown in the stirring device must be put in motion so that the air is well distributed through the oil, and it goes without saying that the quantity of oil placed in the kettle does not exceed two-thirds of its capacity. The heating of the oil is required chiefly to hasten the thickening, but also to drive off any moisture that may be present. If boiled oil is to be bodied artificial heating is not necessary, as the agitation itself will produce a warming of the oil, but the agitation will have to be carried on longer. When such an apparatus is not handy the oil may be thickened or bodied in an open kettle by heating it until a temperature of not over 500 deg. F. is reached, at which it is held until the desired consistency is attained; but at no time should the temperature reach over 572 deg. F., and of course, the oil

must be frequently agitated by stirring with a metal paddle. In a small way linseed oil that has been boiled with litharge or manganese borate may be bodied and bleached at the same time by exposing it in thin layers to sunlight and air.

—1423—

Bleaching Linseed and Other Vegetable Oils with Fuller's Earth.

Fuller's earth is, chemically speaking, a hydrosilicate of alumina and magnesia, whose bleaching properties depend largely upon the characteristic of the mineral itself as well as upon the degree of fineness. While for some oils or fats the coarser texture is preferred, there is no doubt that the finer the pulverization the more effective is its action in bleaching. Especially is this the case with linseed oil, while for some fats the coarser earth is desirable. With linseed and other oils that are not used for cooking or table use a warming of the

—1424—

Bleaching Linseed Oil in a Small Way.

Get a bottle of clear white flint glass of the size most suitable, fill it with pure raw, well-settled linseed oil up to the shoulder on which the neck sits. Place on a shelf or hang it up at a window where the sunlight has free access, but do not cork up the bottle. A quicker way to bleach raw linseed oil is to pass it through several layers of coarsely granulated bone black or, after agitating it with genuine fuller's earth, through a filter. Refining or bleaching with acid cannot well be done in a small way, as a certain apparatus is needed in this treatment for agitating and steaming the oil.

—1425—

Trade Customs in Selling Linseed Oil.

It is probably not generally known to the painting trade that linseed oil barrels are marked with gross and net weights, and the net weight divided by the arbitrary figure of $7\frac{1}{2}$ pounds per gallon, while any pure, raw linseed oil actually weighs a trifle over $7\frac{3}{4}$ pounds per gallon at a temperature of 60 degrees F. and boiled linseed oil 7 13-16 pounds.

Assuming that you purchase a barrel of raw linseed oil weighing 480 pounds with a tare of 75 pounds, you are charged with 405 pounds of oil, which, figured at $7\frac{1}{2}$ pounds per gallon, will be theoretically 54 gallons and so billed. But the oil weighing $7\frac{3}{4}$ pounds, or close to it, you will find in that barrel only $52\frac{1}{4}$ gallons of oil in place of 54 gallons.

This is a trade custom established by long usage.

—1426—

Combination Oils For Mixing Paint For Rough Work.

We give a few formulas for making composition oils published some thirty years since by a master painter in the employ of the U. S. Government at Washington, D. C. Composition No. 1—Twelve gallons (100 pounds) melted rosin, three gallons crude petroleum oil and fifteen gallons benzine of 58 deg. or 62 deg. Baume.

Composition No. 2.—Twelve gallons (100 pounds) melted rosin, three gallons crude petroleum oil, fifteen gallons benzine of 58 deg. or 62 deg. Baume and ten gallons raw linseed oil. This will be more elastic and dry and wear better than No. 1.

Composition No. 3.—Melt 100 pounds rosin and remove pot from fire; when cooled somewhat, reduce with eighteen gallons 56 deg. or 58 deg. Baume benzine,

add two gallons crude petroleum oil, two gallons paraffine oil, four gallons second run rosin oil, or if this cannot readily be obtained use menhaden fish oil. Mix this with raw linseed oil, gallon for gallon, and the mixture will be found better than pure linseed oil in paint for exterior rough work.

Composition No. 4 for mixing cheap mineral black paint.—Fifty gallons liquid coal tar, fifty gallons refined pine tar, fifty gallons benzine, all mixed well and fifty pounds air-slaked lime sifted in, and the mass beaten, so that the lime powder is worked well into the liquid. Finally, ten gallons B. asphaltum varnish is added. Mineral black or graphite will serve to give body to the liquid. No heating is required.

—1427—

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Japan Oils and Other Oils and Their Uses.

A. C. K., Pennsylvania, wants to have our opinion of certain brands of oil offered to the trade in place of linseed oil, for which certain claims are made, sometimes that of superiority over linseed oil as to wear and durability and especially economy.

Answer:—It is against our policy as publishers to give an opinion on materials, which are prepared under proprietary formulas, so long as they have been used with success by master painters for the class of work for which they are offered, and this has been the case with the japan oil you refer to. We know for a fact that it has given results satisfactory to railway car constructors and in paints for iron and bridge work when directions were followed. As for the other oil referred to, we understand that it is somewhat new on the market and that it is claimed that it will produce a lasting luster when used in thinning paste paints.

—1428—

Linseed Oil Foots and Neatsfoot Oil.

There is a vast difference between the two materials. When we speak of foots oil we generally mean oil foots, the residue or settlings in linseed oil tanks in which the crushers and large consumers of the oil store their quantities of the oil before transportation or consumption. These sediments or settlings are known as foots and consist of mucilaginous and moisture, and to use this in paint will retard its drying indefinitely. That is the reason why varnish makers cannot make use of the ordinary unsettled linseed oil that is usually found in casks or barrels sold to the general trade, and why specifications issued by the government and other large users insist on well settled raw linseed oil.

Neatsfoot oil, on the other hand, is not of vegetable origin, like linseed oil, but an animal derivative; that is, produced by boiling in water for a long time the feet of cattle from which the hoofs have been removed. It is not a drying oil like linseed oil; in fact, it will not dry at all, but simply congeals in time, but is used for impregnating shoes against water, also to preserve harness by softening the leather, and in grease for belting and machinery. Neatsfoot oil is always much higher in cost than is linseed oil.

—1429—

Elastic or Non-Cracking Linseed Oil.

The simplest method to prepare rubberoil is to purchase pure para rubber, cutting it into fine shreds with a sharp knife kept continually wet with water. Dissolve 3 pounds of the shredded rubber in 8 gallons of turpentine with gentle heat in a jacket pan, and when solution is complete, add 2 gallons of boiled linseed oil, warmed to a temperature of 100 deg. F. and mix well. Strain while warm and store in a warm place, well covered from dust.

—1430—

Oil of Cedar and Oil of Hemlock, Their Uses.

Both of these oils are classed as essential and might be considered as spirits rather than oil, because of their volatile characteristic, though neither of them is as volatile as spirits of turpentine. There are two kinds of cedar oil, the high priced one, now quoted at \$1.20 per pound, being distilled from the leaf, the lower priced grade, obtained from the destructive distillation of the wood, now being obtainable at 20@25c. per pound, according to quantity. Only one type of oil of hemlock is now quoted at \$1.10@1.15 per pound, this being obtained in a similar manner as the oil of cedar from the leaf. The high-priced oil of cedar is used in the preparation of polishes, because of its aromatic odor; also in special preparations for painting fur closets or chests to keep out moths, etc., while the cheaper grade of oil of cedar is useful in the making of stains and varnish for hiding the odor of mineral spirits. Furthermore, when rugs, carpets, etc., are infested with moths, the oil of cedar in shallow dishes set about the room will drive away the motns more effectively than camphor balls. In seasons, when the painter, in doing exterior work, is troubled with gnats or other insects, a small portion of the oil of cedar added to the oil paint in place of turpentine will keep those pests away and will not do any injury to the paint, if otherwise prepared correct for exterior wear. Oil of hemlock has similar virtues to the oil of cedar from the leaf, but has not the strong insecticide qualities, and unless some one has discovered special virtues in its use, we have no information as to why the high price should be paid for the article.

TURPENTINE AND VOLATILE THINNERS.

—1431—

Turpentine Testing.

The method of testing turpentine for mineral oil adulteration, described by the writer before the Pittsburgh meeting of the Pennsylvania Association of Master House Painters and Decorators, has brought so many inquiries that a repeated description of the test here may not be out of place.

The test depends upon the solubility and insolubility of turpentine, mineral oils and aniline oil, one in the other. In brief, mineral oils, benzine, gasoline, naphtha, etc., are soluble in turpentine; aniline oil is also soluble in turpentine. But the mineral oils are not soluble in aniline oil.

Now if we mix, say, 80 parts turpentine with 20 parts benzine, we obtain a clean, clear, uniform solution; if to this solution we add 100 parts of aniline oil, in a suitable tube or vial, and shake for half a minute or so, we will notice, after a minute's rest, that there are two separate and distinct layers in our tube or vial.

The change that has taken place is very easily explained; the aniline oil can, and does, mix with the turpentine; it cannot, however, mix with the benzine. The result is that the benzine is forced out of the turpentine mixture by the aniline oil and must float by itself on top of the new mixture of aniline oil and turpentine.

To carry out the test it is only necessary to procure a little vial, say three inches high and half an inch in diameter. Into it pour about one inch of the aniline oil; on top of this pour an equal volume of the turpentine to be tested; close the vial with your thumb, shake, and then set aside for a minute or two.

The shape or size of the bottle is, of course, immaterial; it can be large or small, square or round; all that is aimed at is to get equal volumes of turpentine and aniline oil.

Freshly distilled aniline oil is almost colorless; it soon darkens, however, and the oil usually obtained from the wholesale drug houses ranges in color from a pale yellow to a dark red or brown. The color has nothing to do with the test, however; an old, dark oil is just as good, for this purpose as a chemically pure, white oil.

If this mixture remains uniform, does not separate into two layers, after five minutes' standing, then the turpentine contains no added mineral oils.

If the vial with the test is allowed to stand for a day or two, then a separation will take place at times. This is, however, due to a change in the aniline oil and has no bearing on the turpentine at all.

Aniline oil can be purchased from any of the wholesale drug houses. The price is about fifty cents per pound.

Dr. H. C. Stiefel.

—1432—

Turpentine: Tests in Railroad Specifications.

Some roads in their turpentine specifications provide that for each five barrels or less a sample shall be taken at random from one barrel and subjected to various tests. Specifications direct that the specific gravity of the fluid should be not less than 0.86, nor greater than 0.87, at 15 degrees C. or 60 degrees F. Lower gravity than the above indicates the presence of paraffine—naphtha. Higher indicates pariffin—naphtha. Higher range and much residue indicates resin oils distill at 150 degrees C., and 80 per cent. should pass over between 150 degrees and 161 degrees C. The remaining 20 per cent. should not require a temperature higher than 170 degrees to 172 degrees C. The residue in flash or retort should not be more than 2 per cent. to 3 per cent., according to the age of the turpentine, and should be of a resinous nature. Lower temperature range and lower start indicates pariffin—naphtha. Higher range and much residue indicates resin oils or heavier paraffin.

Five grams of turpentine exposed for forty-five minutes in a watch glass four inches in diameter and one-half inch deep to a temperature of 212 degrees F. in the open air, protected from any strong draught, shall not show a residue greater than 2 per cent. by weight. Dropped upon paper there should be homogeneous evaporation and no grease spots. Grease spots indicate resin oils or heavier paraffin. The sulphuric acid test is directed to be carried out thus:—Use a 50 c. c. tube, graduated to tenths, into which pour from 5 to 10 c. c. of the turpentine. After immersing the lower part of the tube in very cold water cautiously add four times as much concentrated sulphuric acid, shaking the tube repeatedly during the addition of the acid, as a means of causing the more assured mixture of the ingredients. Then cool with ice or cold water, cork the tube tightly, mix contents again thoroughly and stand aside for an hour or two. The quantity of clear fluid above the brown mass indicates the material unacted upon by the acid, and this should be not more than 5 per cent. to 6 per cent. of matter not dissolved in the biting substance. In addition to the above specifications some roads further specify that shipments of turpentine must conform closely to the stated requirements, and any appreciable variation in the sample will cause the rejection of the designated five barrels or less from which the sample is taken, the shipment to be returned to the shipper at his expense, he paying freight both ways.

M. C. Hillick.

—1433—

Meaning of the Term Gallipot.

Gallipot is the French term for that portion of turpentine that gathers on the trunks of the various pine trees in winter, when the bark is pierced, and is collected in the month of February. It is equivalent to our crude turpentine or thick turpentine.

—1434—

Why Is Turpentine Advocated in Sign Painting and Not for House Painting?

An Ohio painter criticized us because we had advocated the use of turpentine for exposed sign work, while we condemn its use in outside painting during cold weather. He would like to have us explain this from the practical, as well as theoretical, standpoint.

We were asked two questions entirely at variance. One was as to our opinion for durable white paint for exposed signs, the other for our views as to the durability of oil paint, when applied during cold weather. In sign work, the coats of paint are usually applied much heavier than in general housepainting, hence, in order to obtain thorough drying and hardening and to keep each and every coat from sagging and wrinkling, a portion of a volatile thinner, like turpentine, is necessary, while the finishing coat should be dry with a subdued gloss in order to admit of lettering without creeping or crawling. In housepainting, where at most three coats are given, while a small quantity of turpentine in the second coat is not objectionable, the priming and finishing coat should contain all the oil possible, in order to be durable.

—1435—

Distinction Between Gasoline, Benzine and Naphtha.

When speaking of the origin and production of the liquids named, the statement is made that gasoline, benzine and naphtha are one and the same, especially when petroleum products are spoken of. Petroleum benzine is also called by many naphtha or naptha and there is no real distinction between the two terms. But there is a decided difference between benzine and gasoline. The latter is used as a fuel for lighting, while benzine cannot be used for this purpose without serious

risk. When benzine is manufactured the product is designated by degrees and the higher the degree the higher its volatility. At the present time 65 degrees is the most volatile of petroleum benzine or naphtha and anything over that degree—68 degrees, 72 degrees, 76 degrees—is termed gasoline. When crude petroleum is subjected to distillation the resulting products are, first, the so-called gasolines, which boil and volatilize at low temperatures. The lightest of these is used in gas machines and as a solvent and is known as 84-degree gasoline. The next is 76-degree gasoline, commonly used in gasoline stoves, lamps and automobiles, gas engines and motor boats. The 72-degree and 68-degree gasoline are sold for similar purposes, but in low temperature do not work as well as the 76-degree gasoline. Of the petroleum benzines or naphtha the 62-degree article is most commonly used for solvent, cleaning, etc., although there are some offered as low as 49 degrees, 56 degrees and 59 degrees, the latter being almost equal to the 62-degree in volatility, while those of lower degrees are employed in preparing substitutes for turpentine. When gasolines have been distilled over, the next products are the benzines of varying degrees, as noted. Then comes kerosene or illuminating oil, which in order to be safe, must not flash or ignite at a lower point of temperature than 150 degrees F.

—1436—

Reducing Fire Risks from Benzine.

Whenever you use benzine you can avoid danger from explosion or fire by adding about one pound of common salt to five gallons benzine, which will also deodorize and refine the same to quite an extent. The clear liquid should be drawn off after the salt has perfectly settled on the bottom.

—1437—

Benzine as a Substitute for Turpentine.

Deodorized benzine replaces spirits of turpentine to a great extent, and during the Civil War it was almost universally employed and a high price paid for it. It is now used to a great extent in place of turpentine by the manufacturers of low-priced varnishes and ready-mixed paints, and almost to the exclusion of turpentine by the manufacturers of agricultural implements, farm wagons and the shade cloth industry, wherever a low-priced solvent or volatile vehicle is desired it finds a ready market. And wherever it is simply necessary to cover a surface with paint, that is to dry rapidly and that is afterwards protected by varnish, it serves the purpose because of its rapid and complete evaporation. But while it is really a more reliable thinner for paint than fatty or adulterated turpentine, it does not replace spirits of turpentine by any means, as it leaves oil paint on drying more porous and less binding. Nor can it be employed with satisfaction by the coach painter for thinning his colors or by the decorator for interior work, especially in enameling. Try it for yourself by mixing color fairly stout with oil and drier, then thin one-half of the paint with turpentine and the other half with a similar measure of benzine; apply the two mixtures side by side on an old painted board and expose the board for a week or so and see what happens.

—1438—

Deodorizing Petroleum and Benzine.

Two ounces of fresh, dry chloride of lime are mixed with two ounces of commercial acetic acid, and this mixture is placed into a fifty-gallon barrel of coal oil, the bung put in and the barrel rolled about briskly for five minutes. Then take out the bung for twenty-four hours and decant the clear oil. This done, mix with the clear oil one-half pint fusel oil, shake well and the odor of coal oil will not be very apparent. To deodorize benzine, or at least mask it, put into

fifty gallons of it four ounces of oil of birch and agitate well or add to each fifty-gallon barrel one tablespoonful of fresh chloride of lime and agitate gently. Then add one ounce each acetic acid and water. Mix this in well and let rest for twenty-four hours. Finally add a mixture of three pints benzine and one pint fusel oil that has been mixed for forty-eight hours.

—1439—

Benzine, Naphtha and Rosin Oil.

Benzine is an ethereal hydrocarbon, principally obtained from the distillation of petroleum. Deodorized benzine is obtained by treating the ordinary distillate of petroleum through agitation with plumbate of soda (oxide of lead dissolved in caustic soda), and rectifying with sulphuric acid. Naphtha was the name originally given to rock oil, which is found native, but is now prepared by the distillation of petroleum (in other words benzine, and coal tar, in the latter case it is known as coal tar naphtha, benzol, solvent naphtha, tar oil, etc.). In many parts of the country petroleum benzine of 62 degrees Be. is known under the term naphtha. Gasoline is simply a lighter distillate of petroleum than benzine, and while the most useful of the latter is 62 degrees Be., gasoline is made in three degrees of gravity, viz., 72 degrees, 75 degrees and 78 degrees Be. Many dealers keep gasoline in stock and when benzine is called for by the painter, he is usually given gasoline, but this material is entirely too volatile to be used in paint. Coal tar naphtha or benzol, which is more volatile than the light and heavy tar oils, serves very well for dissolving pitch and coal tar products, but is of no use in linseed oil paints. The only serviceable thinner for linseed oil paints next to pure spirits of turpentine is 62 degrees deodorized benzine, when used with good judgment. Rosin oil is a product of the dry distillation of rosin and is classified as first, second and third run oil, the first run being lightest in specific gravity. It has a disagreeable odor and shows decided blooming, which blueish reflection along with the strong odor can be removed by heating it until thin and removing from the fire, when two pounds of fuming sulphuric acid (Nordhausen), is stirred into every 100 pounds of rosin oil. After mixing for thirty minutes it is permitted to stand for twelve hours, when it is syphoned off into a tub and washed with hot water until the water shows no more acid reaction or litmus paper. After several days' standing, when the water has separated, this oil can be mixed with other oils for lubricating heavy machinery, but rosin oil is not a good paint oil, and should not be employed in paint for exposed surfaces, as it alternately hardens and softens the paint until perished.

—1440—

Composition of Banana Liquid.

Banana oil, or banana liquid for mixing with bronze powder, so called because of its odor resembling that of ripe bananas, is simply a cheaper grade of colodion varnish and can be made in several ways. First—One pound of gun cotton is dissolved in one gallon of acetone and to this solution is added two gallons each of amylacetate and petroleum benzine. The amylacetate must be added first and the benzine afterwards. Second—Dissolve twenty ounces gun cotton in two gallons amylacetate and add two gallons of 90 per cent. tar coal benzol or solvent naphtha. Care must be taken in dissolving the gun cotton and in the mixing of the solution, as all the materials are very inflammable and the operation should be carried on as much as possible in the open and as far from any flame as possible.

—1441—

Denatured Alcohol.

The correct definition of the term denatured alcohol was asked. The inquirer would like to know whether it is as good or better for the use of the painter than 95 per cent. grain alcohol. Also whether there are now three grades on

the market, grain, denatured and wood alcohol. Also if under the new law the tax is removed. Bought some grain alcohol and was told by the clerk in the drug store, that the new law did not affect its price.

The clerk was right in his statement. So long as the alcohol, also known as spirits of wine or cologne spirits, can be used as a beverage or in compounding liquid medicinal preparations, it is subjected to the internal revenue tax on alcohol. Only when rendered unfit for the purposes named by adding some other substance, it becomes denatured, or as it is now termed, industrial alcohol, and is then exempt from taxation. Grain alcohol is also known as ethyl alcohol and forms the basis of all fermented liquor and can be produced from grain, potatoes, etc., in fact from anything that contains starch or sugar. Wood alcohol is known also as methyl alcohol and is derived from the destructive distillation of wood. When a small percentage of the latter is mixed with the former, it is rendered undrinkable, in other words it is denatured. Other substances may also be employed, and for ordinary purposes the Government formula for a denaturant is five per cent. of wood alcohol and five per cent. of benzol, added to ninety per cent. of grain alcohol. Whether the denatured alcohol will serve the purpose of the painter as well as grain alcohol will depend upon the properties of the denaturizer, but at any rate, it will be a vast improvement on wood alcohol.

—1442—

Methylated Ether and Sulphuric Ether.

The inquirer has a formula for frosting glass, one of the ingredients of which calls for methylated ether, but when he applied to druggists for the substance he was advised that they sell only sulphuric ether. He wanted to know the difference between the two articles.

Methylated or methylic ether is wood ether, or oxide of methyl, with the chemical formula C_2H_6O , and differs from sulphuric ether as does wood alcohol from grain alcohol. Sulphuric ether is oxide of ethyl, with the chemical formula $C_4H_{10}O$, and is produced by the action of concentrated sulphuric acid on 90 per cent. alcohol, while methylated ether is prepared by the action of carbonic acid on wood alcohol. Probably either of these would work in your formula.

—1443—

Difference Between Venice Turpentine and Crude Turpentine.

Venice turpentine is a balsam, similar to balsam of fir or Canada balsam, and a thick liquid of syrup-like consistency, imported from France, while the crude turpentine is a thick, soft, white substance, known as ink turpentine, or gum thus, and is only worth one-tenth of the price of Venice turpentine.

—1444—

What Is Venice Turpentine and What Is Oil of Turpentine?

Genuine Venice turpentine is the product of the larch tree, *Larix Europæa*, but is now a rare article. It is very pale and aromatic, of the consistency of thick honey, similar to Canada balsam, which we believe is generally sold for it. It is a first-class material to mix with gum damar, in order to make damar varnish work more freely. It can be added also to shellac varnish for a similar purpose.

Oil of turpentine is the name given in Europe to our spirits of turpentine. It is also called essence of turpentine.

—1445—

Turpentine Substitutes in Paint.

While we cannot recommend all of the products offered as substitutes for the gum spirits, or even the wood spirits, we are convinced that there are some of them that will take the place of spirits of turpentine with excellent results for interior flat work especially. The best of these evaporate rather more slowly than turpentine and hence permit better leveling of the surface than even the pure spirits, and yet the paint will dry rapidly enough. Not so with the ordinary petroleum spirits that are known under the term benzine, while gasoline, which is often sold as benzine, is entirely out of the question. The better class of turpentine substitutes we have reference to are like benzine and gasoline, petroleum products, but are distilled from foreign oil, such as is imported for these very purposes from Borneo and Sumatra and from the Caucasus and the borders of the Black Sea. It seems to be a fact now well established that the crude oil that makes the best burning oil is not the one adapted to produce good substitutes for turpentine. Some years since petroleum products were offered under such names as Brazilian, New Zealand and Russian turpentine, but these were too greasy and too slow in evaporating; in fact, never did fully evaporate. The best method for testing these substitutes is to take a sheet of white writing paper and place two or three drops each of pure spirits of turpentine and the substitute offered on the same, doing this deftly and watching the time of disappearance of each, also whether any grease stain is left by the substitute after fifteen minutes. If a grease stain is on that part of the paper where the substitute has been dropped after thirty minutes, the article is unsafe to be used for inside flat work, also for flat paint that is to be covered with varnish. Nor is it fit to be used in thinning paste wood filler, being apt to make varnish creep. In such case it is best to use ordinary benzine, or if this sets too rapidly, and it is necessary for economy's sake, a mixture of benzine and spirits of turpentine. Do not be misled, however, by a strong turpentine odor in these substitutes, as this does not add to their efficiency.

—1446—

Simple Test for Petroleum Naphtha in Turpentine.

Oil of sodium (commercially known as aniline oil) does not remain mixed with any petroleum products, but will remain in admixture with either gum spirits or wood spirits of turpentine for a long time. On this fact is based the simple test made by the excise authorities of Prussia as to the purity of spirits of turpentine. Equal volumes of the suspected article and aniline oil are placed in a glass test tube and, placing the thumb over the opening, it is vigorously shaken for a minute or so and then stood away in a vertical position for observation. If, after twenty minutes, no separation of the oil and spirits has taken place, it is pure spirits of turpentine, either from wood or gum. Presence of benzine, no matter of what degree, or of gasoline or kerosene, will be revealed by the formation of two strata, one dark, the other light yellow, or water white, even when as little as from three to five per. cent. of the adulterant is present.

—1447—

Fatty or Gummed Up Spirits of Turpentine.

Very stale or very fatty turpentine is a detriment to the adhesive as well as to the drying quality of any paint with which it is mixed, and we do not think that it would serve well as a gold size, because it has lost its oxidizing power (the power of absorbing oxygen from the air) by being exposed. The function of gold size is to bind gold or other leaf to the surface upon which it is to be attached, and, therefore, the most essential part of the size is its power of absorbing oxygen in order to hold tenaciously to the surface and then in turn

hold the leaf which is imbedded into the size. We do not believe that stale turpentine would fill these requirements, even if a drying medium were mixed with it. Test it out in a small way and note result.

—1448—

Solvent Naphtha and Turpentine Substitutes.

The relation of or the difference between solvent naphtha and the heavy petroleum distillate now on the market under the name of turpentine substitute.

Solvent naphtha is a product obtained by the distillation of coal tar and is also known as coal-tar benzol. It is a first-class solvent for resins, but of disagreeable odor and rather inflammable. Its market price, as a rule, ranges higher than that of the heavy petroleum spirits, marketed as substitutes for turpentine. These heavy benzines, that are sold under fanciful names with the addition of some ethereal or essential oil or without such additions or admixtures, are specially selected from petroleum of the cyclic or aromatic hydrocarbon, known as the methanyl or benzol group. For instance, Pennsylvania petroleum, while the very best for lubricating purposes, cannot be made into a heavy benzine that would serve the purpose of a substitute for turpentine. The cyclic hydrocarbons necessary for this are found in many petroleum naturally as, for instance, the benzines made from Roumanian or Borneo petroleum contain as much as 25 per cent. benzol and its derivatives, toluol, styrol, etc. Only with such a percentage of solvent naphtha, whether it be natural or added, will petroleum benzine fulfill its mission as a substitute for turpentine and show the proper high flash point. The higher boiling point of the substitutes can be attained with other benzines than those referred to by removing the low boiling portions through fractional distillation and the addition of solvent naphtha. Thus a boiling point of from 212 deg. F. to 356 deg. F. and a flash point ranging from 65 deg. to 105 deg. F. may be obtained by adding more or less of solvent naphtha. The tarry odor of the latter can be partly removed by mixing the liquid with an aqueous solution of caustic soda, allowing it to settle and decanting the resulting product.

—1449—

Venice Turpentine, Its Origin and Uses.

Venice turpentine is the refined sap of the larch tree growing in some parts of Europe, and resembles to a great extent the crude turpentine from our Southern pine. But its odor is more aromatic than that of the latter, and it does not turn white or fluoresce on solidifying as does the ordinary crude or thick turpentine from the pine tree. The refining process simply consists of driving off the moisture from the crude say by low heat and straining when it is of pale yellow color, transparent and of the consistency of thick honey, very viscid. It is used by some decorators in wall sizes, also in pastes to give adhesiveness and elasticity, also mixed with shellac varnishes and other spirit varnishes to counteract brittleness and allow them to spread more freely. It is also recommended for use in small portions with damar varnish. True Venice turpentine commands a rather high price, being quoted at present in quantity at thirty-two cents per pound, while artificial Venice turpentine can be bought at about nine cents per pound. The latter, however, is simply a refined grade of ordinary crude turpentine from our Southern pine. Note:—The prices quoted do not obtain at the present time—1919.—Editor.

—1450—

To Emulsify Spirits of Turpentine.

There are quite a variety of ways and means by which turpentine may be emulsified, it only depends upon the use that is to be made of the emulsion, as to which method is the best.

All emulsions naturally contain water, and mixtures of water and oil are apt to become rancid on long standing. This is also true to a minor extent with turpentine emulsions, their odor assuming a penetrating sharpness not unlike that of melting rosin. Emulsions may be made with starch, glue, casein in solution, gum arabic and soap, also oils and waxes. Emulsions of turpentine for medicinal use are best made with gum arabic, dissolved in water or with gelatine solution, while for technical purposes the emulsifying agent may be selected according to cheapness, using soft soap or a mixture of soft soap and a solution of glue. For instance, you may belt six ounces of glue in sufficient water and while hot add the solution to enough hot water in which one pound of soft soap has been dissolved to make a total of one gallon of emulsion. This quantity should emulsify two gallons of turpentine, probably more, according to the use you desire to make of it. If it is desired to make an emulsion that retains the odor of pure spirits of turpentine, the best emulsifying agents will be found in wax and in rosin oil. Of all the waxes, japan wax is best for the purpose and this wax emulsion is made as follows:—Two pounds of 96 per cent. potash is dissolved in 5 gallons of boiling water and 14 pounds of japan wax sliced, gradually introduced, while constantly stirring. When the wax and potash solution have formed a uniform emulsion, in other words, a wax soap, 42 pounds of turpentine is stirred briskly into it and the kettle removed from the fire. If, on cooling, the emulsion is too stout, it may be thinned with boiling hot water. The same method may be followed when oil is to be used in place of wax, the plan in either case being to saponify the emulsifying agent with the potash. While any vegetable oil can be used, it is best to select well refined rosin oil of pale color.

—1451—

The Advantage of Using Pine Oil in Paint.

Pine oil or pinoline, as it is sometimes called, is really rosin spirit and may be used in paint in place of turpentine, where slow evaporation and the tarry smell are not objectionable. It is the first product in the distillation of rosin oil from rosin, and by further treatment the tarry odor can be eliminated. However, it would not pay you to do so, and you can utilize this pine oil by adding it, in moderate quantity, to shingle stains, to barn and roof paints; in fact, to **any** paint for outside work in place of turpentine, and also replace with it a small portion of the linseed oil used in thinning the paint for outside surfaces.

—1452—

Cedar Oil and Its Uses.

Cedar oil is really spirit distilled from cedar wood by destructive distillation by a process similar to that of obtaining wood turpentine from pine lumber, pine knots, stumps, etc. Its odor is very pungent and penetrating, and the oil or spirit is very useful in driving moths and insects out of rooms where they are lodged, when the oil is distributed in shallow dishes about the rooms. So far as its use in paints is concerned, it is only practical when it is desired to keep away gnats and small flies from fresh paint by adding it to the paint in place of turpentine, in sufficient quantity to make it effective through its odor. It will not evaporate as rapidly as spirits of turpentine, but this should not make a great deal of difference in exterior paint, because it is not much slower than turpentine distilled from the wood.

—1453—

Difference Between Venice Turpentine and Ordinary Thick Turpentine.

Venice turpentine resembles very closely the crude turpentine from our long leaf pine trees. It is an oleo resin from the European larch tree and has a more aromatic odor than the ordinary turpentine and does not, like the latter, fluoresce

or turn white. It is pale yellow in color, transparent when clear and resembles strained honey in consistency. It is used by some decorators and paperhangers, in sizes to give elasticity and adhesion, also in spirit varnishes to correct brittleness of such gums as shellac. It has also been used in marine paints and is used in the manufacture of flypaper and by pharmacists in making plasters.

—1454—

Best Thinners for Asphaltum Paint or Varnish.

For true asphaltum, we would prefer reducing with 59 deg. benzine, while for a so-called asphaltum paint or varnish, that is made of all coal tar or part coal tar and asphaltum, we would use coal-tar naphtha, the so-called light oil of tar. Thinning with benzine will make the resulting film of paint or varnish rather brittle on drying, but produces quicker drying than will the coal-tar naphtha, but when using benzine for hastening the drying the heavy benzines of 49 deg. and 56 deg., the so-called substitute turpentine must not be used, nor must gasoline be used in thinning, as it is entirely too volatile.

PAINTING AND PAINTING MATERIALS.

—1455—

Florence Flake and Chremnitz White.

Florence flake or Chremnitz white is finest selected white lead (hydrated carbonate of lead) ground in best damar varnish or in a very pale white enamel varnish. The name flake white is derived from the form in which the dry white lead was produced, *i. e.*, flakes, so called, because of the very fine quality and whiteness. Chremnitz white was so called from a misspelling of the name of the town, Kremnitz, in Austria, where white lead was made of an exceptionally fine and dense quality. When prepared for artists' use it was made in the form of small cubes, each cube wrapped in blue paper and sold in wooden boxes lined with blue paper, which made the article appear especially white. Flake white could also be had in cubes, drops, or in powder form. Many in the trade are of the opinion that flake white is zinc white and apply the term to that material, while the only fancy name for oxide of zinc is Chinese white. The Florence white, sold in the United States in paste form and in liquid form, is French process zinc white, ground in damar varnish.

—1456—

Sublimed Lead as a Paint Material.

Our inquirer had been reading some on the subject of sublimed and other white lead, and he had tested certain brands of white lead with the blowpipe, when he found some of the leads reducible to metal, while others only gave a cinder in this test. One of these last named leads has been used on certain jobs which he knows turned out badly. Would thank us for a few pointers, as he desires to purchase only the very best material in order to have his work durable and satisfactory in all respects.

It is difficult for anyone not directly interested in any one particular brand of white lead to say which will wear longest and give most satisfaction. There is a wide divergence of opinion on the question as to whether sublimed lead or white lead made by the Dutch process is best for durability. The friends of sublimed lead claim that white lead chalks in a short time and dusts off, leaving the wood bare, while the friends of white lead claim that sublimed lead lacks body, becomes brittle and cracks. Dutch process white lead is hydrated carbonate of lead, while sublimed lead is a combination of about 86 per cent. of lead sulphate and 14 per cent. zinc oxide. White lead in oil can be readily reduced to a metallic button with the blowpipe, while sublimed lead in oil is rather stubborn in this test and can only be reduced with the blowpipe when fused with powdered borax, and then only with difficulty. Unless the two materials are exposed on one and the same surface, a comparison is unjust to either. Each one has its particular virtue and should be treated or used accordingly.

—1457—

Testing Lithopone White as Against Zinc White.

How can the painter determine whether white paint that is sold as zinc white actually contains zinc oxide or the zinc compound known variously as lithopone, Charlton white, ponolith, etc? Also, is this material a safe one to use for exterior painting?

Zinc oxide (ZnO) is a perfectly light-proof pigment, turns yellow when heated but on cooling returns to its natural whiteness. It is soluble without effervescence in dilute nitric acid, hydrochloric acid, sulphuric acid and in acetic acid without giving off any other odor than that of the solvent.

Sulphuretted hydrogen has no effect upon it, as it has upon white lead, which latter becomes black from contact with that chemical.

Lithopone, ponolith, Charlton white, Griffith's white and under whatever name zinc sulphide (ZnS) in admixture with barium sulphate (BaSO_4) may be offered to the trade, is readily recognized when treated with dilute acids, as it gives off sulphuretted hydrogen (which is recognized by its very disagreeable odor, similar to that of rotten eggs). In the dry state this material is sold in various grades, designated by seals, such as red, green, blue and yellow seal and gold seal. The manufacturers in Continental Europe, as a rule, brand their normal product, consisting of about 30 per cent. by weight of sulphide of zinc and 70 per cent. sulphate of barium, as red seal, while the manufacturers in the United States use the green seal for that grade. The lower grades are branded as the notion of the maker dictates, and there is no standard rule for their composition. They are made from the normal product by the addition of barytes, as a rule, while in very rare instances chalk is added in small portions.

The gold seal lithopone contains a larger percentage of zinc sulphide than the normal and is not offered to the general trade, being made for special purposes at a much higher cost.

—1458—

Quantity of Lampblack Required for Black Paint.

How much lampblack should be added to one gallon raw oil to make a paint ready for use, and what is its covering capacity for one coat work?

Taking the best grade of Germantown lampblack as the basis, we would say that one and one-half pounds dry lampblack added to one gallon raw linseed oil would be sufficient to make a paint that will cover in one coat, but such mixture is not fine enough, nor will it dry without the addition of drying japan.

A better way to make and figure on a black paint is to purchase pure lampblack ground in oil from a reputable manufacturer or his dealer, and calculate on mixing, say, three pounds lampblack in oil, one pint of japan drier and one-half gallon raw linseed oil, making one gallon of black paint that will cover from 900 to 1,200 square feet of surface, according to its condition.

—1459—

The Value of Lampblack in Paint.

Lampblack of the best grade, as now put on the market by all reputable paint manufacturers, in strictly pure form in oil, is what is known as oil black, made by the combustion of fats, grease and oils of all sorts and calcination of the resulting soot. Lampblack of this character, when ground in pure linseed oil, with or without driers, is bulkier than the finest drop black of the lightest specific gravity, and when the latter is made from pure bone black without the addition of gas carbon black, it will stain white lead or zinc white to a tint from eight to ten times deeper than when similar portions of drop black and white are used. Lampblack of the kind described makes with white paint a tint of bluish gray, while drop black that has not been strengthened by the addition of blue produces a dull gray tint. Gas carbon black, on the other hand, while as strong a stainer as the strongest lampblack, makes a decidedly brownish-gray tint with the absence of any bluish tinge. Some drop blacks consist of pure calcined bone black, and these are most lustrous, next to ivory blacks, while others are the result of the calcination of all sorts of animal and vegetable refuse, such as bones, hoofs, rancid fats, vines of hops, etc. These last named drop blacks are stronger in staining power, but rather gray in the solid alongside of pure freshly calcined bone blacks. The absorption of oil in the grinding process is indicated as follows:—To grind 100 pounds of these blacks in oil to commercial paste form, requires—

20 pounds gas carbon black and 80 pounds of oil.

27 pounds lampblack and 73 pounds of oil.

40 pounds drop black (mixed) and 60 pounds of oil.

50 pounds of drop black (pure bone) and 50 pounds of oil.

The best grade of lampblack carries more oil than drop black and the pigment is in a finer state of division than it is in drop or bone black; does not carry any phosphate of lime as is the case with the latter, and if this counts for anything, which it surely does, it stands to reason that lampblack in oil paint is of greater value, as regards durability and wear, than drop black of any kind. Of course, there are exceptions, where lampblack, on account of its gray tone, cannot be employed, because the luster could not be obtained, as, for instance, in such composite greens where gray tones are undesirable. The reason why the painter should use lampblack ground in oil instead of the dry black is briefly this:—When lampblack is simply stirred into linseed oil and driers it becomes lumpy, and even if put through a paint strainer it does not obtain the mulling that it does on going through a stone mill. Neither does it obtain the consequent softening by saturation in the oil that it necessarily gets by standing about in packages after milling in the manufacturer's storehouse or on dealers' shelves. That this latter is actually a benefit has been proven by the writer, who in mixing certain composite colors, in which lampblack played an important part, has matched them to a certain standard, painting each side by side, and after six weeks repeated the operation and found the mixture to paint out and dry very much darker than before. This was corroborated several times over by the consumer of the material. It is more economical to use the lampblack ground in oil, because it will spread further and because the annoyance of streaks in the paint where it is used will be avoided and the last reason should be sufficient to induce the practice.

—1460—

Dead Flat Black That Will Not Rub Off or Chalk.

A dead flat black that will neither rub off or chalk is made by taking any good ivory drop black that is ground fairly stiff in coach japan, and beating it up to a buttery condition with good coach varnish, then thinning it to working consistency with pure spirits of turpentine. Should it have too much of a "sheen," add a little grain alcohol.

—1461—

Can Graphite Be Used for Tinting White Lead?

Pure graphite, being a form of carbon, we do not see any reason why it should not be satisfactory for tinting white lead so long as the proper tint can be obtained.

—1462—

Ultramarine Blue Discoloring in Presence of Sulphur Gases.

Is there any cure for ultramarine blue turning black or purple from sulphuretted hydrogen? The atmosphere in some cities is full of this gas and all the blue stripes on advanced work turn black or dark purple. If it were not for the blue being standard for the stripes the inquirer would change the color.

There is no way of keeping ultramarine blue from decomposing in the presence of sulphuretted hydrogen, although the purple toned blues are less acted upon than the green toned variety. Why not try the best grade of cobalt blue, adding a little zinc oxide, so as to more nearly approach ultramarine? Or make a mixture of equal parts by weight of Prussian or Chinese blue and cobalt blue, adding enough zinc white to obtain the same depth of blue for the stripe; of course, the tone would not be identical, but it would be a remedy, as such mixture would be practically unaffected by dilute acid or acid vapors.

—1463—

So-called English Venetian Red.

The term "English Venetian" red does not necessarily imply that the products are of English origin or manufacture. A brand of Venetian red is largely imported into this country from England through New York and New Orleans harbors. However, during the past twenty years great strides have been made by American manufacturers in duplicating these reds, and it is difficult to say from a small sample whether the goods are made in England or in the United States of America. The specifications of U. S. Government bureaus call for at least 20 per cent. sesquioxide of iron in the light shade, 40 per cent. in the medium shade, and 30 per cent. in the dark shades of Venetian red, over 15 per cent. of silica, and balance to consist of sulphate of lime. Of two samples submitted to us, a dark shade of red consisted of about 10 per cent. sesquioxide of iron, a small percentage of silica, balance of hydrated sulphate of lime (gypsum). It is very poor in covering power and tinting strength and makes a far better water color than an oil color. The second sample was a bright Venetian red of fair tone, and contained about 25 per cent. sesquioxide of iron, with a fair proportion of silica, while the larger portion of this pigment is carbonate of lime or chalk, commonly known as whiting. It has great covering power and nearly three times the tinting strength of the first, but is not a safe pigment for paint in the presence of sulphur gases, and no railroad or government chemist would accept it.

—1464—

Venetian Red.

The term Venetian red was originally applied to native or natural red ochers, and only during the latter half of the last century was the term applied commercially to artificial products or to native iron oxides that were extended or stretched with such mineral bases as terra alba or calcium carbonate. Venetian red, as it is on the market today, is mostly of artificial preparation, made from copperas or from the waste liquors obtained in various industries where iron is pickled for galvanizing or plating. When made from copperas it is called the dry process and until within a very few years the copperas, together with lime stone or gypsum rock, was placed in muffled furnaces, but the process has been modernized by the use of the reverberatory furnace, where a certain portion of copperas with enough mineral base to produce a red pigment of a certain percentage of sesquioxide of iron (Fe_2O_3), is exposed to the action of flame, but not to the contact with fuel direct. The flame passes over a bridge and then downward over the material, which is spread over the hearth. By this process, a very pale Venetian red cannot be obtained, though the range in the darker shades is quite variegated. The variation in shade is produced by the degrees of heat used in calcining the materials. A dull red heat will produce a fairly bright color of medium shade, bright red heat will give a dark shade, while white heat will produce a dark purple color.

When Venetian red is made from the waste liquors obtained in metallurgical processes, the method pursued is called the wet process and consists in running the liquors into tanks and adding scrap iron to destroy the acidity of the liquor. Then milk of lime is added in sufficient quantity to precipitate all of the iron, after which the precipitate is collected on filters and dried in the most convenient way and finally calcined in a suitable furnace with about three parts sulphate of lime (gypsum) to one part precipitate, which addition must be made if the iron liquors contained hydrochloric acid. The brightest shades of Venetian red are produced by mixing and grinding together pure oxide of iron of scarlet hue with calcium sulphate (gypsum) in any desired portion. There is no standard for the purity of Venetian red, the generally adopted basis or commercial usage being that a good Venetian red or bright color shall not contain less than 20 per cent., while the medium shade should not contain less than 40 per cent. and the dark shade not less than 30 per cent. sesquioxide of iron (Fe_2O_3) with a base of inert

material, such as occurs with iron oxide in nature to the extent of not over 15 per cent., the balance to consist of gypsum exclusively, either in fully hydrated form or in dehydrated or dead burned form. Authorities assert that the reds made from copperas or waste liquors when properly prepared are fully equal in permanency to the natural reds.

—1465

What Retards the Drying of Orange Mineral in Damp Weather?

A Chicago painter uses orange mineral in oil for painting metal surfaces, and finds that in damp weather the paint, if not dry over night, will not become hard for a week. He asked whether the orange mineral absorbs moisture after it is ground in oil.

Any linseed oil paint when used on any kind of surface but especially on metal will dry more rapidly and thoroughly in dry atmosphere than in damp weather. The paint, especially the vehicle, will take up moisture from the air, but we do not think that red lead or orange mineral will be affected more than white lead, and it is pretty certain that lead pigments will not absorb moisture in such a high degree as the pigments of lighter specific gravity. We think the slow drying in such an instance is due to the condition of the surface and atmosphere, and but little of it attributable to the pigment and vehicle in the paint.

—1466—

Chrome Yellow in Oil and Japan.

When chrome yellows are ground in oil for the trade, color grinders grind them in either clarified, raw or bleached linseed oil in order to keep the color as clean as possible. When ground for the coach painter a pale gold size japan is usually employed and oil is added only when there is a demand for slow drying, which, however, is rarely the case, it being exceptional in these days of rapid and hurried shop work. It is self evident that ordinary grinding japan, the grade in which coach blacks are ground, will not answer for chrome yellows, it being too brown in color. When the gold size japan is very strong a small percentage of raw linseed oil may be required to temper the drying, and if quick drying or heavy varnish is used in grinding chrome yellow, a little turpentine must of necessity be added during grinding.

—1467—

Mars Yellows Composition and Properties.

While yellow ocher of the finest floated variety has been substituted for Mars yellow, the true article of that name is really artificially prepared yellow ocher, and should be classed as a chemical color. It can be made by precipitating iron salts, such as ferrous sulphate (green vitriol) or ferric chloride (chloride of iron) mixed with alum by means of a solution of caustic soda, potash or lime. The percentage of alum in the iron solution governs the depth of shade obtained in the dry pigment. The precipitate must be thoroughly washed to free it from soluble salts, filter-pressed and dried at moderate heat, when it will produce a stable and reliable pigment. By calcining Mars yellow in various degrees of heat the various hues known as Mars orange, Mars red and Mars violet are produced. When properly prepared they may be depended upon in mixing safely with all pigments excepting those of organic origin. However, Mars colors are now very seldom called for with the exception of artists' tube colors or by decorators in fresco work.

—1468—

Preparation of Gamboge as an Oil Color.

Some information was wanted as to the preparation of gamboge as an oil color. The inquirer placed two gallons of a superior oil in a copper kettle, heating it to 290 degrees F., and then stirred in 25 pounds of gamboge gradually, heating the mass to 300 degrees F., while continually stirring; took it from the fire and strained it through a fine cloth, which took over two hours, as it was very thick. Out of the mass he recovered nine pints of liquid and 20 pounds of bottoms and the liquid lacked proper color. Would like to be informed how to treat gamboge to obtain desired results.

Your treatment of gamboge was radically wrong. The pipe gamboge of Siam, which comes in long round sticks, is about as pure as any that may be found in commerce and contains close to 78 per cent. resin and 18 per cent. of gum. The resin, which is the real coloring matter in gamboge, can be obtained pure by crushing the sticks into fine powder and mixing it with a little water to a stiff paste, then shaking up the mixture with ether, which dissolves only the resin. The best method is to add to this ethereal solution some drying oil and gum varnish, and then draw off the ether by gentle heat. The colored semi-liquid mass which remains is put into jars, tubes or cans to be used as an artists' oil color, and requires no further treatment, except perhaps to give it a run through a cool porcelain lined grinding mill with a little good Kauri or Zanzibar gum varnish. You used entirely too much gamboge in proportion to the oil and too high a temperature. Six pounds of gamboge should have been ample.

—1469—

Torbay Brown Paint.

Torbay brown paint is very little called for on this side of the Atlantic, and then only by ship chandlers, who get it made for their patrons from the other side. It is, so far as we know, put up in paste form, ground in linseed oil, and while it is lighter in shade than the general run of what we know as metallic paint or mineral brown, its covering properties also depend very largely upon the percentage of ferric oxide it contains. The analysis of the pigment from a commercial sample of Torbay brown would indicate that it is composed of yellow ocher, burnt umber, chrome yellow, a small percentage of red oxide and 80 per cent. of the total barytes and whiting.

—1470—

Is Vandyke Brown a Safe Pigment.

Is Vandyke brown a safe pigment for exterior as well as interior use and what does it consist of?

The Vandyke brown as supplied to the markets in the United States is better described as Cologne earth or Cassel brown or Cassel earth, designating the localities where this dark brown earth, which consists of organic and bituminous matter, is obtained. It cannot be depended upon for absolute permanency, although when used as a solid color it will stand exposure for quite a time. When employed for tinting white and used on exterior surface it will change in a rather short time, losing its lavender tone and becoming a dull gray. Vandyke brown of this origin is largely employed for staining furniture and in graining it is used ground both in water and in oil. The material sold in Continental Europe as Vandyke brown, especially in artists' tubes and for water-color painting in various forms, is more permanent and consists of calcined ochers that run through a scale from red brown to violet brown. These were, it is claimed, used by the great Antwerp painter Van Dyck, hence the name. Another permanent material, also sold under the name of Vandyke brown, is simply a dark brown variety of

colcothar. Neither of these, however, have the rich brown tone of the Cassel brown, and although much stronger and much more opaque would not be of any use in staining or grainers' work. The painter who desires the tint given by the Cassel brown variety of Vandyke brown with white for exterior work can easily produce it and have it permanent by using burnt Turkey umber, drop black and Tuscan red.

—1471—

Reno's Filler and Fuller's Earth.

An inquirer desired to know whether Reno's filler is a raw or burnt umber, or a different material from umber earth; also whether or not there is another name for the material known as fuller's earth.

Reno's filler is native American umber earth of a variety that is low in the percentage of oxide of iron and rich in silicate of alumina. The mineral is mined and prepared in Pennsylvania principally. It is sold in powdered form, raw or natural, and also burnt. It is used largely by carriage painters with lead and coach japan and rubbing varnish in the preparation of roughstuff, as it tends to make pumice or rubbing bricks cut well. Fuller's earth is a soft marl of the nature of clay, containing considerable silica that has derived its name because it is largely used in fulling cloth. Immense quantities are used by oil crushers in clarifying linseed oil and by oil refiners to effect a similar purpose in the manufacture of other oils. In 1901 about 14,000 short tons of fuller's earth was produced in the United States, and over 10,000 long tons were imported from England, chiefly. The prices for the domestic product averaged \$9.50, free on board of cars, while the prices asked for the imported goods fluctuated according to quality, from \$18 to \$25 per ton, ex dock, New York or Boston. We do not know of any other commercial name for the material; you should be able to obtain it from wholesale supply houses or druggists.

—1472—

Mixing Olive Green Without White Lead.

To make an olive green without white lead use ocher and darken it with lampblack, adding a little raw umber to get the proper color tone. For a moss-green use the same colors except that you should introduce a little chrome yellow.

The Veteran Painter.

—1473—

Chrome Greens and Oxide of Chromium Green.

Why do color manufacturers label a green color or pigment that is known in the old country as Brunswick green under the designation of chrome green? When the inquirer served his apprenticeship in Manchester the color chrome green was a permanent one and was not affected by dilute acids, lye or sulphur fumes, as this chrome green of the present time is. We understood Brunswick green to be a mixture of Prussian or paris blue and chrome yellow, while royal green was similar in tone, but much stronger in staining.

It is difficult to state positively how the trade name chrome green got into common use, but the term is sanctioned by universal suffrage. As real chrome green, which is known to the trade here as oxide of chromium green, is very little used by the craft in general, it is probably least confusing to the buyer and maker alike to adhere to the time honored term chrome green for all green made from bichromate of potash or bichromate of soda and Prussian or Chinese blue.

The real chrome green you refer to is the oxide of the mineral or metal, known as chrome (Cr_2O_3). It can be prepared from the red bichromate of potash (K_2CrO_7) as follows:—The salt is finely pulverized and mixed with one-

eighth of its weight of sulphur and so calcined. The resulting green cake is then a mixture of chromium oxide and sulphate of potassium by this equation:— $\text{K}_2\text{Cr}_2\text{O}_7 + \text{S} = \text{K}_2\text{SO}_4 + \text{Cr}_2\text{O}_3$ (the sulphur having been oxidized by the oxygen in the chromic acid into sulphuric acid). The mass is then boiled in water and the soluble salt of potash removed by repeated washings, but the remaining traces of sulphur in the precipitate must be removed by a second calcination. This oxide of chromium green is rather dull in tone in comparison with the chrome greens of the trade. A more brilliant green pigment is the oxide of chromium green, known as Guignet's green. About sixty-five years ago Guignet, after whom this green is named, discovered a new method for its preparation, which is still in vogue. To form the pigment, 3 parts by weight of bichromate of potash are carefully mixed with 8 parts boric acid to dark red heat. The result is a green cake, from which boiling water extracts borate of potash and leaves a precipitate, that when dry forms a loose, rich green powder, which if further calcined loses its hydrate of water of combination and becomes more opaque, but also duller in tone. Guignet green is also known as *virian vert emeraude* and *Smaragd green*. Its market value is three to four times greater than the ordinary color, and it is used only by artists and decorators, while the ordinary oxide of chromium green is largely used by soapmakers and other industries. To determine whether a green powder is real chrome green or simply what you would call Brunswick green, place a little of each side by side on a piece of tin and hold the latter over a flame until it becomes red hot. The Brunswick green will burn to black, the true chrome green will retain its color.

—1474—

Aniline Dyes and Chrome Green or Yellow.

Are aniline dyes ever employed in the manufacture of chrome greens and chrome yellows? was asked.

We do not know of a single case where such a thing has ever been attempted. Nor did we ever hear of aniline being found in chrome greens or chrome yellows. It would not pay for any color manufacturer to take such a course, as aniline is detected too readily, and, on the other hand, it would not be a paying venture at any rate. Aniline dyes are numerous in the market, but not for use in oil paint manufacture.

—1475—

A Permanent, Alkali Proof Green.

A fresco painter asked why Guignet's green is so high in price in comparison with the commercial chrome greens. Of course it is a truly lime-proof green, but would like to know more about its origin and composition.

Guignet's green is known chemically as a hydrate of oxide chromium under the formula $\text{Cr}_2\text{H}_4\text{O}_5$, and its commercial name is oxide of chromium green. The latter term, however, is also applied to inferior grades, and to distinguish the best grade, which is made by the process discovered by Guignet in 1840, it is given his name. While the oxide of chromium used in the soap industries can be bought for as low as 35 cents per pound in the dry state, Guignet's green cannot be bought for less than \$1.25 and sometimes its market value reaches \$1.60 per pound in small lots.

The process of preparation consists in carefully heating 3 parts by weight of bichromate of potash with 8 parts by weight of borax to a dark redness. This forms a greenish cake, from which boiling water extracts borate of potash and leaves the Guignet green in the form of a rich green powder, which is not attacked by ordinary acids, alkalies or sulphuretted hydrogen. When heated to white heat Guignet's green, like all hydrates, loses its water of combination or hydration and becomes a dull green. In Germany this green is also known as *Smaragd green*, in France as *vert emeraude* and in England as *viridian*.

The greens that we know under the collective term chrome green are simply mixtures of chrome yellow and Prussian blue by precipitation, either pure or extended with mineral bases, such as barytes, china clay or terra alba, sometimes blanc fixe, but most commonly with barytes (heavy spar). They are, it is well known, readily changed under the influence of alkalies and acids, as well as by sulphuretted hydrogen.

—1476—

Dragon's Blood.

The question was asked what dragon's blood is and whether it is fairly permanent to strong light.

Dragon's blood is a resin that has a strong reddish yellow color and is soluble in alcohol, when it may be used as a varnish or lacquer to enrich certain woods without hiding the beauty of the grain. It is not very permanent when exposed to strong light.

—1477—

To Test Density of Dry Colors.

To test the density of dry colors you can only compare those of similar nature, as you cannot well compare ocher with chrome yellow for density. Weigh out a portion of each sample, rub each up in a similar portion of oil, take a small brush and apply over a strongly contrasting color, side by side, noting the result.

—1478—

To Keep Cassel Brown in Soft Paste Form.

Assuming that this question relates to paste for distemper painting we would say that in such case, inasmuch as cassel brown is unaffected by alkalies, you may mix your dry brown with some soda lye of 20 deg. B., and then add enough glycerin of 28 deg. B. until a smooth paste is obtained. If it refers to a paste in oil, however, we would advise you to dry your cassel brown sharply, then rub it under the muller with spirits of turpentine until fine, then add linseed oil to give required consistency. But isn't it cheaper to buy your cassel brown already prepared in paste form?

—1479—

What Is Whiting Composed Of?

Whiting is prepared from white chalk or carbonate of lime, large deposits of which are found nearly everywhere, especially in England and France. This white has a soft and earthy fracture and is without polish. It leaves a mark and adheres to the tongue without any greasy feeling. It has sometimes a yellowish cast, but is more frequently grayish, seldom a clear white. Contains a small portion of silica and sometimes traces of clay, magnesia or iron. The best of brands are those known as English Cliffstone and American Paris White. Commercial or common whiting is usually very gritty and very much off to the gray in color.

—1480—

Difference Between French Yellow Ocher and Ordinary American Ocher.

The selected grades or brands of French ocher are highly valued, because of their uniform bright yellow color, which, without the addition of chrome, give a natural chrome yellow tone, or at least the nearest approach given by

earth colors. Neither this tone nor color, nor the fine, smooth working properties of the selected French ocher has yet been attained by American ochers, at least not in appreciable quantities, and therefore the value of French ochers is twice, even thrice, as high as that of good grades of American ochers.

—1481—

Good Putty, How It May Be Prepared.

To make your own putty without the required machinery is a tedious and wearisome job. Glaziers' putty is made of whiting and raw linseed oil; at least pure putty should be so made. It requires 85 pounds of whiting and 15 pounds of linseed oil, and to make it properly take bolted American paris white and mix it with oil as stiff as you can, then take this soft dough and add more whiting, which can only be incorporated by pounding the mass with a stout club or wooden mallet. When stiff enough so that it will not adhere to your fingers, set the mass aside for a few days to give it what is termed sweating, then pound again, and if still too soft add more whiting and incorporate it by continued pounding. If the putty is wanted for quick drying, use boiled instead of raw linseed oil, or use one pound dry white lead to every nine pounds of whiting.

Much of the putty sold is composed of the most ordinary kind of commercial whiting or marble dust and an admixture of linseed and mineral oil, and lacks binding properties.

—1482—

What Is Gypsum?

Gypsum is not plaster of paris, though made of the same material—gypsum rock. Plaster of paris is the calcined gypsum rock, which is heated to about 300 deg. F. to drive off the water of crystallization, which amounts to about 20 per cent. of its weight. Gypsum, or terra alba, is known to chemists as the hydrated sulphate of lime, with the formula CaSO_4 , and when fully hydrated contains 21 per cent. of water. It is a useful extender for paints, such as ultramarine blue and other colors, and as a base for Venetian red, etc., and is specified by railroad chemists for freight car and bridge paints, etc. Plaster of paris is not permissible as a base in paints because of its tendency to set hard on contact with moisture, even when mixed with linseed oil.

—1483—

Drier to Make Linseed Oil Paint Dry in from Three to Four Hours.

There are paint materials, such as white lead, burnt umber, etc., that impart drying qualities to raw linseed oil; others, that are perfectly inert, and again others that tend to retard the drying of the oil. In order to make linseed oil paint dry, the nature of the pigment that enters into the paint should be thoroughly understood, if it is desired to give it life, as well as drying qualities.

The simple introduction of a drier in the shape of a powder will not fill the bill. In order to obtain the full benefit of drying agents, they are usually introduced in the oil, while it is being boiled, and for this purpose we have chiefly the lead salts and manganese salts, such as red lead, litharge, sugar of lead and lead borate, manganese dioxide, manganese borate, manganese sulphate and manganese oxalate. Strong driers in pulverized form are also offered to the trade, in the various resinates, such as resinates of lead and resinates of manganese, and safer driers in linoleate of lead and linoleate of manganese. By introducing a sufficient quantity of the resinates into boiling oil, such oil can be made to dry in a few hours, but the lasting quality of the oil will be shortened commensurate to the quantity of such drier.

Oil boiled with red lead or litharge will dry most thoroughly, while if boiled with the manganese salts, the oil or the paint in which it is used, unless spread in very thin film, is apt to dry superficially only, causing the surface to shrivel under certain conditions.

—1484—

Method of Mixing Dry Lampblack Without Grinding for Tinting Purposes.

Purchase only well calcined lampblack, that is free from greasy matter and wet it up first with turpentine, beating it into a stiff paste, then gradually add your linseed oil and driers under constant stirring. Should it still be lumpy, run through a fine paint strainer and it will not make your tint streaky.

—1485—

Lithopone White.

Lithopone, or Lithophone, as it is more often spelled, is a sulphide of zinc white, while what we know as zinc white is oxide of zinc.

It is a compound of zinc sulphide and barium sulphate, and was not originally intended for the use of the painter, although it has now replaced white lead as well as zinc white in some industries where these pigments were once largely used. Charlton white, Griffiths white, patent zinc white, are all of similar composition, and the material is also produced in this country under various names. The foreign importations of lithopone are offered in three or four grades, as green seal, red seal, blue seal and yellow seal, the green seal being whitest, finest and most opaque. The specific gravity of this pigment is between that of white lead and zinc white, and its body or covering power superior to that of ordinary zinc white. While it is unaffected by sulphur gases, etc., and therefore a stable pigment for use about chemical laboratories and for interior use generally, it does not stand exposure to sunlight as well as white lead or zinc, and is very apt to blacken when used on exposed surfaces. Nor can it be mixed with white lead or paris green or any pigment having lead or copper for its base, because of the double decomposition that is liable to take place in such mixture. When lithopone is mixed with water or oil or pale varnish and applied as a paint on surfaces exposed to sunlight, it will on drying assume a decidedly grayish tint, which turns white again over night, returning to gray again during sunlight exposure, and this will alternate until the paint has become thoroughly hard. It is, therefore, not a safe, all around pigment for house painters' use.

—1486—

The Apparent Perishing of Chinese and Prussian Blue in a White Lead and Zinc Paint.

A light blue tint was mixed with lead, zinc and Chinese blue and placed in a tightly-corked bottle. Three lots were mixed, using the same quantity of blue, but varying proportions of lead and zinc. On opening the same, three years later, the color was a cream tint, varying in shade in each bottle. Each of these tints was painted on a strip of glass and exposed to the sun at noon. By the next morning the original color had come back.

It cannot be said that in the case of your tints there was any alkaline reaction on the Chinese blue, so long as you used pure white lead and pure zinc, but you may have made use of a drier containing lime. Lime in any form, even whiting, has the effect stated on Chinese or Prussian blues, and we experienced similar difficulties with Chinese blue tints some years ago, but have not noticed any similar occurrence of late, and we attribute the trouble to the use of a drier containing lead and manganese salts, with lime as a hardener. Only recently has it dawned upon us that the use for several years of a strictly oil drier, free from lime, has remedied the defect. As in your case, Chinese blue tints on standing sealed up several months appeared on opening to be white, but on exposure to air assumed very nearly their original light blue color on top, while on being painted out the apparent white or light cream color soon turned blue. It is a

noted fact that Chinese or Prussian blues cannot be employed safely with whiting in kalsomining on account of the decomposition brought about by no matter how small a portion of free lime there may be. Any alkali, such as soda, potash, ammonia or lime, will decompose it into a ferrocyanide of the alkali and oxide of iron, and therefore these blues or any pigments containing the same cannot be used with alkaline bases or vehicles, such as lime, whiting or the silicates of soda and potash. In your case the Chinese blue was not decomposed, but it was temporarily obscured or hidden and brought to light again by the exposure to air and light.

—1487—

What Is Silica and for What Is It Used?

Quartz is the purest form of silica (oxide of silicon) and occurs generally in granite rocks. It is ground fine in water and dried. The finest grades are marketed as floated silica or silex, and are much in demand for making wood fillers. The material being unaffected by sulphur gases, acids or alkalies, has been used to some extent in paints and is still used by some paint manufacturers in their so-called white lead in place of the heavier barytes. We do not advocate its use in paint because we consider it a very brittle mineral, but as a wood filler it has no equal when properly prepared, especially in point of fineness and purity. The material is a difficult one to hold in suspension in oil, and on settling cakes very hard.

—1488—

What Is Bole?

Bole is a pigment similar to clay, and occurs in white, gray, red brown and yellow color. It is a silicate of alumina, and whatever color the mineral possesses is due to the presence of oxide of iron.

—1489—

Recips for Making Terra Cotta Paint.

Two parts French yellow ocher and one part medium Venetian red by weight will make a good terra cotta color, while five parts of white lead, mixed with one part of burnt Italian sienna, will produce a strong terra cotta tint.

—1490—

What Is Burgundy Pitch and Canada Pitch?

Burgundy pitch is an impure resin prepared from the spruce fir of Norway. Canada pitch is pitch from hemlock spruce fir. Burgundy pitch is imitated by melting ordinary resin and linseed oil, 100 pounds of the former to one gallon of the latter, and enough annatto or palm oil to color.

—1491—

Preparation of Sienna by Levigation and Calcination.

The raw sienna is ground in water on buhr stone mills into a series of floating tubs, the deposit in the tank nearest the mill or mills usually containing the sand or grit that is undesirable. The pigment in the farthest tanks is allowed to settle and the water drawn off. The settled portion is allowed to drain on muslin, stretched over large frames, and when nearly dry it is placed in a furnace or retort and calcined at low heat until it has acquired the desired color, when it is allowed to cool and the lumps are crushed by running them through a set of rollers or a pulverizing machine. When the material is naturally fine and free from grit, ordinary grinding is sufficient and levigation un-

necessary, but in all cases the raw sienna earth should be powdered in order to make calcination uniform. For calcining sienna, almost any sort of furnace may be used, but the best results are obtained from muffle furnaces, and the heat should be a low red, which will usually convert the raw material into burnt sienna in from six to eight hours. By using a low red heat the product retains more tinting power than by employing a higher and quicker heat.

—1492—

Formula for Making Oil Gold Size—Also Gold Size for Burnished and Distemper Gilding.

Oil gold size can be made in many ways. For commercial purposes the simplest method is to place boiled linseed oil in a suitable pot and boil at a gentle heat to the point of ignition, then set fire to it and let it burn until it becomes thick and put on a cover to extinguish the flames. Strain through silk thin to proper consistency with oil of turpentine. A little medium chrome yellow or yellow ocher, ground very fine in oil, should now be added.

Another somewhat quicker oil gold size is prepared by heating linseed oil to the boiling point and, under continual stirring, finely pulverized gum animi ls added and the boiling continued until all the gum is dissolved. When the mixture has attained the consistency of thick molasses, which can be ascertained by taking out a sample every once in a while and dropping it on a piece of glass, it is strained through coarse cheesecloth. It should be thinned with oil of turpentine, so that it flows from the pencil, and a small quantity of finely ground chrome yellow or vermilion in oil may be added to give proper color.

Burnished gold size or gold size for distemper gilding is made by dissolving parchment or isinglass in water and adding yellow ocher that has been ground to the utmost fineness in water.

—1493—

Virtue or Value in Paint Made from Paint Skins.

There are several ways to recover useful material from paint skins that are fairly oily and soft, but all labor is lost on the hard scrapings that require to be chipped from sides of mixing pots or paint pots, or when it has to be resolved by means of caustic potash or lime. Paint skins while still oily and elastic may be boiled over a moderate fire with an addition of linseed oil, when the valuable paint material in the skins will soften, so that by straining it may be freed from the useless resinified, insoluble matter. This makes a first-class paint for roofs and general painting, but should not be used for priming under any conditions, because top coats would be apt to peel from it. The best method, however, so far as economy is concerned, is to keep a skin paint receptacle in the shop, have all remnants from pots and mixers deposited therein, and run the material through paint mill and strainer before it becomes too old and fatty.

—1494—

Composition of Various Colors and Tints.

Many of the names given are those of the aniline type or coal-tar colors, but we will do our best to give an idea how they may be compounded from the more or less stable pigments. As pigments vary so much and differ so widely in point of strength we shall not attempt to name quantity of each required to produce them. However, as you have not mentioned whether you have water colors or oil colors in view, we would caution you against the use of white lead in making tints for distemper work, while you may take your choice between white lead and zinc white for making tints in oil, always thinking of the fact that zinc white

will produce the cleanest tones and is not so apt to darken tints on interior work:—

- Absinthe Green—Pale French paris green and white.
- Auburn—Indian red, drop black and Venetian red.
- Azure Blue—In oil, cobalt blue and finest zinc white; in water, Bremen blue and little zinc white.
- Bay—Burnt umber, Dutch pink and Venetian red.
- Beaver—Drop black, not blued, and burnt umber.
- Cafe au Lait—White, burnt umber, med. chro. yellow.
- Chocolate—White and burnt umber, with trifle yellow.
- Chestnut—Burnt umber, ivory black, yellow ocher.
- Damask Red—Rose madder or French carmine and a trifle scarlet lake or vermilion.
- Dove Wing—White, ultramarine blue and drop black, with tinge of red lake.
- Electric Blue—Chinese blue and ultramarine blue mixed and a touch of bronze red.
- Electric Green—Electric blue and lemon chrome.
- Electric Turquoise—White, electric green and electric blue.
- Egyptian Brown—Asphaltum for glazing or for solid work: Ivory black, not blued, and burnt umber.
- Fawn Pink—White, drop black or raw umber, vermilion and chrome yellow.
- Gothic Blue—Indigo or Chinese blue free of bronze, white and drop black.
- Golden Russet Olive—Lemon chrome yellow and light Venetian red or burnt sienna.
- Heliotrope—Carmine lake and white.
- Jonquil—White and lemon chrome yellow.
- Isabella—Med. chrome yellow, burnt umber, Venetian red.
- Mauve—Rose madder, ultramarine blue, white.
- Morella—Rose pink, with trifle drop black and white.
- Muddy Amber—Burnt sienna, chrome yellow, drop black.
- Mulberry Red—Yellow ocher, burnt sienna, white.
- Murrey—Dark Venetian red, toned with red lake.
- Old Blue—White, Prussian blue and trifle yellow.
- Old Ivory—White and raw sienna.
- Old Pink—White, rose lake and raw umber.
- Old Red—Tuscan red and drop black, trifle white.
- Old Rose—Rose madder or carmine, white and trifle drop black.
- Pearl Drab—White, ultramarine blue, drop black, Venetian red and ocher.
- Parrot Green—Ultramarine blue, Dutch pink and lemon chrome yellow.
- Pompeian Red—Dark India red and red lake, or a good deep Tuscan red.
- Puce—Vandyke brown or burnt umber and drop black, with a trifle chrome yellow or ocher.
- Roan—Unblued ivory black and burnt umber.
- Russet Yellow—Orange chrome, white and burnt sienna.
- Shrimp—White, raw sienna and a trifle vermilion.
- Sorrel—Orange chrome, with Venetian red, or vermilion and ocher.
- Tan—White, burnt umber, yellow ocher and Venetian red.
- Tuscan Brown—Tuscan red, yellow and drop black.
- Tuscan Drab—Tuscan red, white and drop black.
- Vandyke Drab—Vandyke (Cassel) brown, white, ocher and drop black.
- Vellum—This effect can be produced in oil by the use of strongly boiled linseed oil.

Warm Olive—Gold ocher and raw umber, with a trifle drop black.

Warm Olive Green—Medium chrome yellow, raw Turkey umber and ivory black.

Warm Russet Olive—Orange chrome yellow, burnt sienna and raw umber.

In the foregoing we have grouped the pigments so that the colors of which the greatest portion is required always heads the list and the one of which least is wanted is last named.

—1495—

Composition of Steel Color for Painting Machinery.

Steel color paint is a vague term, and the successful formulas are proprietary. We know of dozens of paints that are sold as steel colors to manufacturers of machinery, and each one appears to differ somewhat from the other in depth of shade or hue, in point of fineness, in odor, in time of drying and also in finish. Some are dead flat when dry, others have a high gloss, and others again have a sort of egg-shell finish. Many have the blue-black color of bar steel, others are grayish, while many again are of the brown-black cast. To design or make a paint to imitate the color of steel, it is necessary to first intend for rough work or for fine finished surface. In some cases, too, three and even four coats are applied, two different preparations being used for the various coats, while for ordinary work one or at most two coats are deemed sufficient.

Rapid drying appears to be one of the essential points demanded or expected in these paints, eight hours being the limit permitted on fine work, while four hours for each coat seems to be the time mostly looked for in the drying of the cheaper grades. These quick-drying paints cannot carry much oil in their composition, and, therefore, the vehicle must be a combination of japan, varnish and turpentine or benzine of a quality to conform to the selling price. The pigments also vary to a great extent, lampblack, drop black, graphite, mineral black, or a mixture of any two of these with a little ultramarine blue or Prussian blue and white lead or zinc white forming the bases, according to the depth of color that may be required.

No doubt in the very cheap grades of these steel colors there are also diluents in the form of barytes, silex and whiting introduced, especially in such as are offered in paste form.

But the very best grades that are sold at a fair price in a ready-to-use form, and dry with a high finish, appear to be composed of good pigments, ground and mixed with the best coach japan and good coach varnish and thinned with pure turpentine.

—1496—

Coal-Tar Colors Versus Natural Dyestuffs.

Give your opinion as to whether all coal-tar derivatives in the color line must be classed among the fugitive dyestuffs, and whether there are not some of these that outlast the colors or dyes derived from vegetable and mineral sources, which they are imitating or supplanting with the trade. A fellow workman in the decorating line, who served his time at the profession in the old country, contends that all coal-tar derivatives are fugitive, and while some may serve their purpose for dyeing cheap fabrics they should not find their way into the assortment of colors, be it oil or water, used by the decorator. On the contrary, the writer believes that great progress has been made in the production of colors from coal-tar during the last twenty-five years.

You are quite right, and while a large volume could be written to prove the truth and force of your argument we will confine ourselves to a few of the best-known colors that are made from coal-tar derivatives. These are the synthetic madder lake known as alizarine and synthetic indigo. Aside from their great value as permanent dyestuffs and colors their discovery and development have proved a great boon to millions of people who can now use the fertile soil that formerly produced madder and indigo for the purpose of planting cereals to sustain life. Ample time has elapsed since the first marketing of synthetic madder, forty years ago, to convince the most skeptical of the superiority of alizarine dyes and lakes over the extract from the madder root, which is now practically a thing of the past as an article of commerce. A well-made red lake from alizarine has more fire and life than the best article made from the root of the madder plant and far outlasts the latter on exposure to strong light.

This is due to the control, which the color chemist has, in the case of aliz-

arine over the article supplied by Nature in the madder plant. The latter is subject to the same variations as any other plant, tobacco, for instance, which does not yield the same strength or quality every season. With the coal-tar derivatives this is vastly different, as anthracene, from which alizarine is derived, is not subject to the variations of seasons. Deep red and violet alizarine lakes, well made, are more permanent than madder lakes of similar tone. Rose madder (synthetic) made from purpurene, also a derivative of anthracene, is not quite so fast, yet as permanent as that made from true madder. But note the difference in price and consider the advantage of that feature. Synthetic indigo is a more recent product, but its discoverers, the Badische Soda and Aniline Company, known as the Badische Company, have defied the chemical world to prove that their product is not natural indigo derived from the sap or extract of the tropical plant of the East Indies. That synthetic indigo is equal in permanence to the natural product has been also proved in tests conducted for a period of over five years. Another proof that some of the coal-tar derivatives are more permanent to strong light than some of the older colors of mineral or vegetable origin is the so-called paranitraniline, commonly or collectively known as para reds. When carefully made these reds outlast mercurial vermilion, the so-called English or Chinese vermilion, in point of retaining color, where the other tends to brown off or blacken on exposure. It is true that the so-called artificial or eosine vermilions and the lakes that derived their coloring matter from aniline dyes, such as fuchsin, eosine, methyl violet, etc., were very fugitive, but many of the later developed groups of coal-tar derivatives should not be classed as aniline colors, as they are more permanent than many of the reds of vegetable or animal origin.

—1497—

Test for Quality Graphite.

To determine the nature of the extender used with graphite requires the services of a chemist, but the value of graphite to be used as a paint material is determined by its fineness and tinctorial strength. To test its fineness the practical man mixes the samples with linseed oil to a paste, spreading same on a strip of glass and passes his spatula over it, repeating this operation with all the samples. To test for strength, which also indicates percentage of carbon present in each sample, in a cursory way similar portions of each sample are mixed with similar quantities of white lead or zinc white and rubbed out with similar portions of linseed oil to utmost fineness, then placed side by side on a strip of glass and the sample which has stained the white most is the strongest, contains the most carbon and is therefore most valuable, providing the fineness of the samples is similar. Graphite should be free from sharp grit. The usual adulterants for graphite paint, so-called extenders, are the various silicates, calcium carbonate, calcium sulphate, very seldom barytes.

—1498—

Sweating of Oil Paint and Its Cause.

When oil paint appears to be thoroughly dry and hard, but on humid days it has a dull appearance that looks as if someone had gone over it with a cloth dipped in kerosene oil and when the hand is passed over it, while not feeling tacky, yet slightly greasy, it is termed sweating, and the cause is rosin oil, or mineral oil or cottonseed oil having been used in the paint.

—1499—

Uses of Bone Black.

Bone black, as its name implies is made from the bones of animals by charring the same in a closed retort, after the grease, fat, etc., has been removed by boiling or by dry distillation. By the later process, oily matter,

known as Dippel's oil, is obtained. Before calcining the dry bones they are comminuted into pieces or grains of various size, so that the charring process may be more uniform in its results. Ivory black was so named when made from the waste cuttings of ivory articles, but at the present time it is simply produced by charring selected bones. The average composition of bone black or drop black, as it is often called, is 15 per cent. carbon, about 77 per cent. ash of mineral matter and 8 per cent. water. Of the ash or mineral matter about 63 per cent. is calcium phosphate, the balance consists of silica alumina and a little iron. Ivory bone black has a finer tone and more luster than that made from ordinary bones, contains a slightly higher percentage of carbon and phosphate of lime and less iron and alumina silicate. It is better adapted for the finer grades of printing ink, plate printing, and on account of its high percentage of calcium phosphate for blacking and polishes than the ordinary bone black.

Freshly calcined bone black makes an excellent filtering and bleaching agent and is extensively used in sugar houses for refining sugar. When it has served its purpose there it is known to the trade as sugar-house or spent bone black, and is often washed to free it from the vegetable matter imparted to it by the impurities in the sugar that is bleached and purified by passing through the granulated black. This spent black is unsafe for use as a pigment in oil, japan or varnish paint, as the impurities are never fully removed. It finds its way into fertilizers on account of the high percentage of calcium phosphate it still retains after its service as a refining and bleaching agent. In the paint industry very large quantities of pure bone black are used, ground in water for distemper painting, in oil for sign and decorative work, in japan for coach and car painting and also in varnish for a similar purpose. Wherever lampblack or carbon blacks are too gray in tone bone black or ivory black has the call. But bone black or ivory black must not be confounded with animal black, which is made from other animal products besides bones, such as the skins, hoofs, horns, hair pieces of leather, etc., calcined in pretty much the same manner as bones. Such blacks lack the presence of calcium phosphate to a great extent and are not so well fitted for blackings and polishes as the pure bone blacks, but are denser and more opaque by far and are preferred by many painters to a pure bone black as a black paint.

—1500—

The Most Expensive Colors Used by Painters.

What are the most expensive oil colors used by the house painter and decorator in his routine work of house and sign painting and interior decoration, and which is superior?

Answer: In answering this question not only first cost per pound must be considered, but also the tinting strength of the color and spreading capacity as well as its opacity or hiding power, when used as a solid color or when used in combination with other colors. Whites and blacks are not, in the strict sense of the terms, colors, but simply paints. Therefore, they need not be considered at all in this connection. Nor can we consider artists' colors as sold in tubes, but must confine ourselves to colors sold in quantity. This cuts out carmine, madder lake, oxide of chromium green, Chinese vermilion and the high-priced lakes of the artist's palette.

The so-called English (quicksilver) vermilion we consider the most expensive color, because of its low spreading power.

Ultramarine blue of best quality is next in line, as to comparative cost. While Chinese or Prussian blues are much higher in price they have, when chemically pure, from six to eight times greater tinting strength and absorbing more oil, pound for pound, make a greater volume of paint. Chemically pure chrome greens are next in order, because the higher price paid for these as against the commercial grades does not show up to advantage when paint is made from either and then compared as such for spreading, etc.

As to the color superior to any in the general painting line, we should say that among the reds the synthetic madder lake (made from alizarine) is most permanent and the cheapest red in the end for the sign painter, while in the blues chemically pure Chinese blue takes the crown. As to quantity consumed Venetian red takes the lead, while yellow ocher is a close second.

—1501—

Italian Pink, Also Dutch and English Pink.

Italian pink, English pink, Dutch pink, Quercitron lake, Still de grain, brown pink, are all rather fugitive pigments when exposed to direct sunlight, as their coloring is of vegetable origin, mostly from the extract of Quercitron bark and Persian berries. The best of these yellow lakes are those sold in drop form such as French yellow lake, superior quality and No. 1 quality, and these are rather strong, as they do not contain much mineral base. They are also transparent and serve well as glazing color over green and red, giving pretty effects, but are, as stated, very fugitive, especially when used as water color. Italian pink, English pink, Dutch pink are simply lower priced yellow lakes, which have lost their translucency and tinting strength according to the percentage of base clay or calcium carbonate or barium sulphate, upon which the coloring matter has been fixed during the process of manufacture. This process consists of the boiling of the crushed bark or berries in water, filtering the extract, to which is added a solution of alum and a further solution of soda or pulped chalk and the colored precipitate collected and washed, filtered and dried. English pink, Italian pink and brown pink are difficult to find in the market to-day. Dutch pink (the German Schuttgelb) is still used to a great extent in the powdered form, as a means of producing various combinations with other pigments at a moderate cost. The sort that is based on calcium carbonate is best adapted for use in stains, while the kind based on clay or barytes is far safer to use in combination with chrome greens that are composed of Chinese blue and chrome yellow, because calcium carbonate is not a safe pigment to combine with such a green.

—1502—

The Difference Between Bottle Green and Bronze Green.

A true bronze green, as we understand it, no matter whether it is dark or light in shade, should contain very little or no blue at all, but should be made from ivory or bone black and chrome yellow, medium for the lighter shade and black and chrome yellow orange for the dark shade, while bottle green should be composed of bone black, Chinese or Prussian blue, chrome yellow and ocher. The latter should have a distinct greenish tone, while the former should have a bronze tone. But of late years, any old way of mixing these colors appears to go and the set rules of twenty or thirty years ago are generally disregarded. All sorts of paint shop refuse or remnants of color are nowadays used in making up a bottle green; siennas, ochers, lampblack and chrome green, together with barytes and whiting go to make it up and many make up their bronze greens after this fashion as well; the so-called chrome greens mixed with any kind of black and yellow ocher being constituents.

—1503—

Waxes of Interest to Painters and Paint Manufacturers.

What waxes aside from beeswax and paraffine wax are used in the manufacture of furniture and floor waxes or polishes, and are therefore of interest to painters and paint makers?

Carnauba wax, of vegetable origin, which occurs in thin films on the leaves of a palm growing in abundance in Brazil. It is a very hard wax, rather brittle,

of grayish color and melts at from 180 to 185 degrees Fahrenheit. It is used for floor polishes with ceresin or beeswax. Ceresin is the refined form of ozokerite or mineral wax found in nature, and can be obtained in yellow color or in white. It resembles paraffine wax to some extent, but is less scaly. Has driven beeswax and paraffine wax out of furniture and floor polish manufacture to quite an extent. Its melting point varies somewhat, but is near that of beeswax, usually 135 to 140 degrees Fahrenheit. Paraffine and ceresin waxes are employed in paint and varnish removers.

—1504—

Composition of Pullman Color.

How the so-called Pullman color is made:

Pullman color derives its name from the color with which the bodies of the Pullman cars are finished, a sort of bronze green of more or less depth. Nearly every railroad using this color on their equipment has a standard of its own and no two of them are exactly similar in tone or depth of shade. Therefore it is difficult to give the exact composition. The basis of all Pullman colors, however, is ivory drop black with a good portion of medium chrome yellow or orange chrome yellow or both, and a small portion of Tuscan red. In some cases a high grade of French ocher replaces part of the chrome yellow and burnt Italian sienna of fine tone may be used in place of the Tuscan red. Some few samples have been found to contain small portions of white lead in addition to the other pigments mentioned, but these had a rather flat appearance. Whether wanted in oil for ordinary painting or in japan for quick drying or coach work, the color is best made by mixing the required colors that are ground in oil or the colors of similar name that are ground in japan, then thin them as required for the purpose in view. As an example, weigh out fifty-five parts by weight of a good coach black in japan or in oil and twenty parts medium chrome yellow, also in japan or in oil, fifteen parts orange chrome yellow in japan or in oil and ten parts best Tuscan red in japan or oil, as the case may be; mix these colors in paste form very thoroughly, thin the resulting paste partly, then strain and you will find that you have a Pullman color of excellent tone and body, provided you have used pure colors. Vary the figures given to suit requirements.

—1505—

Tuscan Red with White Lead as Ground Work.

If you mix Tuscan red with white lead you will have a tint from pink to purple, according to quantity of color and white lead used. Some of the latter-day Tuscan reds, instead of being made by precipitating wood lakes or alizarine (synthetic madder) lake on oxide of iron pigment, are colored up with some red of the para group, which will bleed more or less, that is, impart some of their color to any light color or white in connection with which they are used.

In purchasing any red, the nature of which you are not familiar with, whether such color be dry or ground in oil or in japan, thin it with oil and turpentine to painting consistency, then place a few drops of the mixture on a piece of white blotting paper, holding the paper over a lighted match, not near enough to the flame, however, to scorch the paper, and note the color of the liquid that saturates the blotter around the hillock of red. If the ring or halo is clear or only the color of the oil, the red will not stain any white it may be applied under or over, but if the discoloration is plainly deeper than light straw it bleeds and is not fit to be used in cutting in with white or vice versa. If this explanation does not answer your query then please tell us what you really mean.

—1506—

Why French Yellow Ocher Is Preferable to All Other Yellow Ochers.

Reason why the best painters prefer the yellow ocher imported from France to those mined and prepared for the trade in the United States.

The chief reason for the preference of French yellow ocher must be looked for in the fact that only the better qualities are imported into the United States, because it would hardly pay to import inferior grades, there being no difference in the customs duty between the higher qualities as against the inferior qualities of ocher, the duty being a specific one, so much per pound, not *ad valorem*. The next reason for its preference over those of domestic origin must be looked for in the clear color tone of the French article, which is of the chrome variety, whereas other ochers generally tend towards brown or red, especially after being ground in oil. No matter whether a French ocher is of a pale citron shade or a dark shade, it has a chrome tone that produces a clear tint with white, from which any suspicion of red is absent. The best grades of French yellow ocher are generally free from grit, of a smooth, unctuous texture and grind down fine in oil without a perceptible change in shade. Our Southern yellow ochers, on the other hand, are more difficult to grind down fine, even on buhrstone mills, and when ground fine the gritty feel still remains and there is a change in shade to a dull brown, as a rule. The high percentage of sesquioxide of iron, Fe_2O_3 , does not compensate for these defects, and even if the painter can obtain the domestic ocher at a lower price per pound, the resulting paint will cost him more, because he is unable to make as much liquid paint from it, weight for weight, because it does not absorb as much liquid as does its French namesake. And even if all other things were equal, the color of the domestic ocher is against its use. Assuming a painter desires to make a composite green from drop black, Prussian blue and yellow ocher, he would be compelled to add chrome yellow if he used domestic ocher in order to obtain the shade, which he could obtain by using French yellow ocher without the addition of chrome yellow, and even then his shade of green would not be as good. Nature seems to have laid down in the deposits of French ocher just the proper admixture of earthy constituents to make it an ideal paint material of yellow color.

—1507—

Waterproof Oil Paints and Water Paints.

A formula for making good waterproof paint:—

Dissolve one pound ordinary yellow or brown rosin soap in two quarts of water, then add six quarts boiled linseed oil and one ounce zinc sulphate (white vitriol). When all is in solution, take from the fire to a safe place and add two quarts turpentine or benzine, while still warm. Add whatever color you desire, until you obtain a soft paste, then strain through a fine mesh wire sieve and thin with more turps or benzine. Use mineral or earth paints only in the dry state, but see that they are finely pulverized. For which use zinc oxide and whiting and a trifle of ultramarine blue to take away the yellow cast of the whiting. May be used outside or inside. If you desire an elastic oil paint that will be waterproof and weatherproof for canvas or awnings, etc., follow this rule:—Cut up into thin slices 3 pounds yellow bar soap or rosin soap and boil this in 5 gallons raw linseed oil, stirring frequently, and when dissolved take from the fire and thin with at least two gallons of turpentine or benzine. When cooled, add any color that is alkali-proof to this liquid, until the required body or opacity is obtained, then strain and thin with more oil or with varnish and turpentine or benzine until the paint is of the right consistency. For black use bone black with 5 per cent. Prussian blue; for buff, use yellow ocher; for red, use Venetian red or red oxide, and so on.

Flexible paint can be produced by dissolving one pound yellow soap in one gallon boiling water, adding the solution hot to 10 gallons ready mixed oil paint. Good for coating canvas, tents, etc.

—1508—

Utilizing Paint Skins for Rough Work.

Soft paint skins will readily soften or dissolve when boiled at a moderate heat with raw linseed oil. Before placing the skins in the kettle they should be chopped up somewhat and at first only enough oil is put into the kettle to barely cover the skins. The fire must not be too hot, and the mass must be constantly stirred with a hardwood paddle to keep the mass from clinging to the sides of the kettle. If the material in the kettle merely simmers for a number of hours, the skins will dissolve. If the mass becomes too thick as the skins soften more oil should be added and the boiling kept up till the skins are well dissolved. When this has been accomplished, take the kettle from the fire, and while the mass is still warm, but not hot, gradually stir in benzine (not gasoline), until the mass is of a stout brushing consistency. Before using, run through a paint strainer of ordinary mesh. This makes a good paint for rough work, such as fences, sheds and the like, but we would caution against using it as a primer for woodwork. If it is to be used on tin roofs, thin it in the kettle with more linseed oil, adding only enough benzine to make it work freely. As a rule, no drier will be needed.

Another method is to make a solution of one pound of sal soda in one gallon of water. Cover the old paint with sufficient of this solution, and, after stirring the mass, let it stand for a few days. Pour off any water that may be on top by that time, stir in linseed oil and benzine until brushing consistency is obtained, then strain and put away for use. Before application, add a little drier.

—1509—

Red Lead Paint and Its Properties of Protecting Iron from Corrosion.

Why do some engineers in charge of construction work persist in specifying red lead for first coating iron or steel structures, while others oppose its use and specify graphite or oxide of iron paints in preference?

We think that competition among supply men and the desire of consumers to keep down first cost in material is the chief cause of the difference of opinion as to the relative value of red lead and other paints. Whenever red lead has failed, it has been due to the fact that the paint was not properly prepared or that it was improperly applied.

The reason why the government service and some of the largest railway companies in the United States still adhere to red lead painting is that their specifications call for pure red lead containing a certain percentage of lead trioxide, that they invariably purchase only dry red lead to be mixed on the spot where the operation is going on in pure raw linseed oil well settled by age and without drier. The consequence is that the paint dries by oxidation on the surface to which it is applied in a cement-like film that admits of no pores through which moisture may infiltrate, and furthermore, the metal is clean and free from mill scale. On the other hand, the prepared red lead paints, mostly extended largely with barytes or whiting, have no such properties, and are no better than the oxide of iron paints or graphite paints which supply a loose, porous film over the surface.

—1510—

How to Mix Colors and Tints.

How to mix the following colors and tints for outdoor work:—Copper color, snuff color, dark buff, leather brown, chestnut brown, brick red, cream tint, flesh tint and fawn.

Not knowing what brands of white lead and oil colors you intend to employ in mixing the colors and tints we cannot furnish proportions that you can depend upon, therefore you will have to work out your own propositions by following

the lines we are laying down in each case. If you wish them to wear well you will have to select a good brand of white lead, high-grade colors, pure linseed oil and turps and good japan. Remember, the parts here given are by weight:—

Copper Color:—Medium chrome yellow, 2 parts; medium Venetian red, 1 part; drop black (not blued), 1 part; probably more of the last.

Snuff Color:—Medium chrome yellow, 2 parts; Vandyke brown, 1 part; if not deep enough and some strong burnt umber, or more Vandyke brown.

Dark Buff:—White lead in oil, 70 parts; French yellow ocher, 5 parts; Venetian red, 1 part.

Leather Brown:—French yellow ocher, 8 parts; Venetian red, medium, 4 parts; lampblack, 1 part; white lead in oil, 7 parts; should this be too dark add more color and white, but omit black.

Chestnut Brown:—Medium Venetian red, 3 parts; medium chrome yellow, 6 parts; lampblack, 1 part.

Brick Red:—French yellow ocher, 3 parts; medium Venetian red, 1 part; white lead in oil, 1 part. Vary these portions according to shade desired; for very dark brick red omit the white lead, also omit it for Philadelphia medium brick, but use it if imitating light red pressed brick. To cheapen brick red paint add sulphate of lime (gypsum) or carbonate of lime (whiting), but do not use cheap domestic or adulterated ocher.

Cream Tint:—Is best made by tinting 99 parts white lead in oil or white lead and zinc combination in oil with 1 part of a rich raw Italian sienna in oil. It can also be produced by tinting 97 parts pure white lead in oil or with lead and zinc combination with $2\frac{1}{2}$ parts French yellow ocher and $\frac{1}{2}$ part lemon chrome yellow.

Flesh Tint:—For outdoor work it is best made by mixing 17 parts white lead in oil with 2 parts orange chrome yellow and 1 part light Venetian red. More delicate flesh tints are made by mixing white, Naples yellow and English vermilion, but this mixture is too expensive for outdoor work.

Fawn:—White lead in oil or white lead and zinc combined in oil, 16 parts; burnt umber, 2 parts; Indian red, 1 part; lemon chrome yellow, 1 part. In order to arrive more quickly at the right shade without having too much of a surplus, strain the various colors before adding the same to the mixture.

—1511—

Preparing Water Colors in Cake Form.

A formula for preparing water colors in small round cakes, the size of a five-cent piece. To be an article similar to that used by school children:—

The dry colors that constitute these aquaselle colors must be in the finest state of pulverization, otherwise they must be passed through color mills several times after being made into paste form in a solution of gum arabic or dextrine and water. The best solution is that made with gum arabic, as dextrine is liable to impart a reddish tinge to delicate yellow colors. To test gum arabic for purity, make a solution with water and add to a test tube half full of the solution one drop of tincture of iodine. If the solution remains colorless, the gum is pure; if it discolors reddish blue, it is adulterated with dextrine. Mix the dry color in the necessary quantity of gum arabic solution, and for every ten parts by volume of solution used add one part of refined glycerine, and in order to permit the resulting cakes of color to mix with water without separation, add a very small portion of prepared beef gall. We are not in position to furnish exact proportions of either the gum arabic solution or the addition of beef gall. You will have to determine this by actual trial. When you have made the stiff color paste you must have the proper forms or models ready to press the paste into and the models should be lightly waxed or greased so that the cakes when dry will leave the form without breaking.

—1512—

A Chemically Neutral Red Pigment.

In a recent book on landscape painting mention is made of a red pigment that is absolutely neutral, chemically considered, and ten times more powerful than the best vermilion. Can you impart any information on this red, who discovered it and what its base is?

We are not at present in possession of the book you refer to, but we have no doubt that the author has in view the organic color known as paranitraniline, now generally sold under the trade name red body toner, while the different manufacturers have given it proprietary fancy names. The dyestuff from which this red is produced was first introduced here in 1893 or 1894, but it required some time before color makers recognized the great value and the extent to which the color could be developed. The dyestuff was, if we are not mistaken, discovered in Germany and imported into this country by the representatives of German dyestuff manufacturers. Its manufacture was first taken up with a view of lithographic ink making, and later developed by adding mineral bases into artificial vermilion reds for replacing eosine vermilions and chrome red for sign, coach and carriage and implement painting. The group of coal-tar derivatives, of which this para red, as it is called for short, is a member, has variations, as betanaphthaline, metranitraniline, alpha naphthaline, and the process of their development is quite intricate. Great care and low temperature are required, and a deviation in temperature is liable to ruin any batch. We are not prepared to here give a description of the process, but may say that the strength of the pure color—that is, the color itself without any inert base, may be gleaned from the fact that from four to six ounces of the dry stuff when ground fine in varnish and then added to one gallon of varnish will color the latter a strong, bright red that when applied in one coat over an appropriate ground will give an apparently solid surface of the color of deep English vermilion. Six pounds of this pure red and 94 pounds barytes ground in paste form and thinned with benzine to the consistency of ordinary paint will cover raw wood solid in one coat.

—1513—

Water Glass for Painting Woodwork.

How water glass (sodium silicate) is used in painting woodwork.

To the requisite quantity of dry zinc white or impalpable dry color add enough water glass (silicate of soda) of 33 degrees Beaume to make a stout paint. beating it up well with a paddle, then strain and thin with enough water to make it flow freely from the brush, but hold it stout enough to cover. As it sets rather quickly, do not cross and recross too often. If one coat does not cover well and uniformly, give a second coat, but not before the first one is dry and hard. This will give the appearance of high gloss enamel paint and is practically fireproof. For color, do not use Chinese or Prussian blue, chrome green of commercial type or medium chrome yellow, as they are affected by silicate of soda.

Silicate of soda paints may also be made for water or for oil painting as follows:—Make a liquid by boiling together, say, 28 pounds silicate of soda 45 degrees Beaume and 5 gallons water in a suitable kettle over a moderate fire, sifting in 7 pounds of rosin, I or J quality, previously powdered, stirring all the time until dissolved, then strain through coarse cloth. When cold, stir in your white or pigment; thin with water to brushing consistency and strain again before use.

For oil painting mix equal portions, or gallon for gallon, of the liquid with raw or boiled linseed oil. For white or light colors use raw, for ocher or red oxide or black, use boiled oil. To determine how much of the mixture of oil and liquid is required for a certain amount of pigment, try it first on a small scale, using zinc white for white, ultramarine for blue, lime green for green and mineral black for black.

—1514—

The Covering and Drying Properties of Burnt Ocher.

Why does burnt ocher, as a rule, show so much more covering and better drying properties than the general run of natural ocher? Also give your opinion on the use of burnt ocher as an oil paint on exposed surfaces in place of Venetian red, that is to say, which of the two pigments will wear best?

The greater capacity or covering power of burnt ocher as against the natural pigment, from which burnt ocher is produced by calcination, must be looked for in the fact that during the process the water of hydrogen is expelled, which not pigment than in the natural, but also permits the former to be ground in a only tends to show a higher percentage of sesquioxide of iron in the burnt smaller percentage of oil to make a paste of similar consistency. The combined water, or water of hydration, in the average French yellow ochers varies between eight and ten per cent. of the total pigment, so that it is fairly safe to figure that these ochers, that exhibit on the average 20 per cent. of ferric oxide, when calcined, will show about 25 to 27 per cent. sesquioxide of iron, the water of hydration being combined with the ferric oxide and the oxide of alumina, and not with the silica in the raw state. The removal of the combined water, by calcination, also exerts its influence on the drying properties of the pigment. The natural yellow ocher must be considered as having a retarding tendency on the drying of the oil rather than to hasten it, as is the case with umber, which contains in addition to ferric oxide a portion of dioxide of manganese. Calcined or burnt French ochers are safe pigments in nearly all cases, but some other sorts of yellow ocher from different localities contain carbonate of lime, and if this is present in high percentage it will, on calcination, produce a pigment that gently retards the drying of the oil, for the reason that the heat expels the carbonic acid, rendering the lime caustic; this, in turn, saponifying the oil to such an extent that when the pigment is used for exterior painting and exposed to driving rainstorms, it will cause the paint to be washed off. Therefore, it is an act of precaution to test burnt ochers for the presence of caustic lime, for if such be present, it is far better to use Venetian red, no matter how much sulphate of lime (gypsum) the red may be composed of. Burnt ocher, well levigated and calcined, and thereby freed from grit and combined water, containing not over one per cent. of lime in any form, ground in and thinned with well-settled linseed oil and a minimum percentage of oil drier, is an excellent paint pigment for outdoor work and fully as safe as the best prepared Venetian red.

—1515—

Carbon Paint, Oxide of Iron Red and Mineral Brown.

In the pigments that may be classed as belonging to the carbon group we name only those in constant use, as follows: Bone black, charcoal black, carbon or gas black, coal or coke black, drop black, Frankfort or vine black, graphite or lampblack, mineral or natural asphaltum, artificial asphalt, and coal tar, all of which may be termed, when made up into paint, either alone, in admixture or as component part thereof, carbon paints.

Venetian red was the term originally applied to red oxide of iron, but when we speak of red oxide today we have in view either a native or artificial red of greater staining power and a much greater percentage of sesquioxide of iron, than is usually found in Venetian reds. Mineral red is also an oxide of iron red and might pass, when of fairly bright color as a Venetian red or when of good staining power, as red oxide of iron. It may be classed as a roasted red hematite. Mineral brown or metallic brown is prepared from a brown hematite (limonite) by roasting and may be classed as an oxide of iron paint, dry or ground in oil.

—1516—

The Discovery of Zinc White as a Paint Material.

When was zinc oxide first produced or employed in appreciable quantities for painting?

Leclaire, a Frenchman, was the first artist to introduce it in oil paintings (1835 to 1844). But as an all-around paint pigment, in 1782, the French chemist, Guyeton de Morveau, described the process of making zinc oxide and recommended its use in painting. A French manufacturer named Courtois was the first to produce it in a large way in 1786, but because of its higher market price and its inferior covering power it was unable to make much progress in comparison with white lead. In 1796 an Englishman, John Atkinson, obtained a patent for the manufacture of zinc white, but his product proved to be zinc carbonate, and was useless as a paint pigment. Zinc white was known to the ancients in the preparation of cosmetics and healing salves, where they could not make use of white lead. The names under which zinc oxide was known to them are principally Pomopholyx, Narsoticum frigidum, Opium minerale, Tutia alexandrina, Nix alba and Nihilum album. The manufacture of zinc oxide on a large scale, however, dates back to 1850, when France, Belgium and Prussia became principal producers.

—1517—

Aiding Blue to White Lead to Avoid Yellow Cast.

Usually ultramarine blue is added to white to take off the yellowish tinge given to it by the oil or varnish. While some Prussian blues are apt to impart a greenish tinge to white lead it is better than ultramarine, which is apt to contain free sulphur, which if present in quantity is apt to produce black sulphide of lead under certain conditions. Take Prussian blue (not Chinese blue) ground fine in oil and thin it to almost the consistency of water with equal parts linseed oil and turpentine (or turpentine substitute), strain it through cheese cloth and add this blue liquid to your white lead in small doses until you have the proper bluish white. You can do this readily by comparing the blued white with the unblued article.

—1518—

Barytes and Blanc Fixe—How Prepared.

Barytes, as we know it, is a natural product obtained from rock known as heavy spar. This rock is mined and transported to mills driven by water power mostly, where the rock is broken into small fragments that are ground through stone mills generally with water, and the resulting product is treated with sulphuric acid in order to bleach it and eliminate the iron, with more or less of which the rock is impregnated. The sediment, which is now in the form of a white pulp, is dried in kilns or other drying devices, and finally disintegrated and packed in barrels ready for the market. Its specific gravity runs from 4.5 to 4.8, and to grind it in oil in paste form requires 91 to 92 pounds of barytes and 8 to 9 pounds of oil for 100 pounds, according to the fineness of the pigment.

Blanc fixe has the same chemical symbol as the natural barytes (BaSO_4), but its specific gravity is much lighter, as will be seen from the fact that it requires anywhere from 20 to 22 pounds of oil for 78 to 80 pounds of blanc fixe to make 100 pounds of paste in oil. The reason of its higher cost must be looked for in the fact that any one of the barium salts that it is made from by precipitation is first derived from the natural baryta rock. The simplest method of production of artificial barytes or blanc fixe is by using witherite. This material, consisting of barium carbonate in its natural state is subjected to finest grinding, then dissolved in dilute hydrochloric acid, when with effervescence carbonic acid is formed. This then forms in the precipitate barium chloride. The saturated solution is then permitted to clear and the addition of dilute sulphuric acid forms a precipitate of barium sulphate, having thus changed from

chloride to sulphate. The precipitate is then repeatedly washed to remove all free acid, filter pressed, dried and powdered, but also sold in pulp form for purposes where it is to be used in wet processes.

—1519—

Permanent White or Constant White.

Kindly inform me whether the terms permanent white and constant white apply to natural barytes or to the precipitated article more generally known as blanc fixe? Also please state its relation in point of opacity or hiding power as against white lead and zinc white.

Permanent white, strictly speaking, is or should be precipitated barytes (blanc fixe), but natural barytes, extra well floated and bleached, has often been sold under the name. Constant white is only another name for the same article. precipitated barytes will when used as a white water color cover up solid, but in oil it works slimy and somewhat transparent. Natural barytes as a pigment in water alone works poorly, though it is somewhat opaque, but in oil it has hardly any hiding power and is only used as an extender for very strong colors, such as chrome yellows and greens. Witherite, the natural carbonate of barium and precipitated barium carbonate has also been sold as permanent white, but the last named, unless thoroughly washed to free it from all traces of sulphur, is a rather unstable pigment to use in connection with lead carbonate or other lead compounds. When blanc fixe is used in connection with pigment colors, such as chrome yellows, chrome greens and manufactured reds, it is employed both as a base and in order to lighten the shades and not so much as an extender or make weight, as is the case with natural barytes, and the same applies to a certain degree when barium carbonate is employed. The terms permanent and constant white were given to the precipitated, as well as to the natural barium sulphate, because of their being absolutely unaffected by acids, alkalies and heat. They have also been known to the trade as barytes white.

—1520—

Manufacture of French and German Carmine.

Process of manufacturing carmine as practiced in Germany and France, also its composition chemically and how to determine the purity of carmine as against substitutes.

As you are most likely aware, French or German carmine is produced from the female of the coccus cacti, the black or gray cochineal, which is received from Central America, Mexico, Algiers and Cape of Good Hope and comprises an important article of commerce for these localities, but into which the new artificial coal-tar colors are making sad inroads of late years.

The best sorts of cochineal consists of nearly one-half of its weight of a red coloring matter of the character of a weak acid known as carmine acid, which can be extracted from the insect by leeching with water. The process of producing the best sorts of carmine remains still the secret of a few manufacturers, as it is a well known fact that by following existing formulas only inferior products can be obtained. The best quality of carmine known to the trade has given the following chemical composition by analysis:—Carmine acid, 56 per cent.; protein, 20 per cent.; ash, 7 per cent.; water at 100 degrees C., 17 per cent.; waxy substance, trace.

The ash from carmine consists of lime and alumina. It would appear, therefore, that true carmine is not simply a lake color, not a coloring matter simply combined with alumina, but its constituents must also include a certain percentage of lime and the animal matter from cochineal. The formulas for the manufacture of carmine, so far as published, uniformly agree as to the boiling of cochineal in water with such additions as tartaric acid, alum, salt of tin, etc., filtering while hot and to permit the filtrate to rest in shallow dishes for quite a

time. A small part of the coloring matter will then settle out as carmine, the liquor being used for preparing carmine lakes. Carmine as well as other reds produced from cochineal coloring matter are not fast to light, but in spite of this it is still favored for painting in oil and water on account of its unsurpassed brilliancy. Alizarine red lake is ten times more resistant to strong light, but lacks the original fire of carmine. Good, pure carmine is insoluble in water, i. e., does not color it, but is perfectly soluble in ammonia, in which way carmine ink is produced. By this solubility and its low percentage of ash, which is left on incinerating carmine, it can readily be distinguished from the inferior qualities and especially from the carmine lakes, that contain large percentages of alumina. The substitutes sold as carmine and carmine lakes, whose coloring matter is derived from coal-tar dyes, can be readily recognized as such, as they are not entirely soluble in ammonia and will even color pure water. Burnt carmine is prepared by heating at moderate temperatures the regular article.

—1521—

Bremen Blue or Bremen Green.

What has become of the blue color we knew years ago as Bremen blue or Bremen green and which was then so extensively used for interior wall decoration in fresco or distemper work, also in kalsomining?

True Bremen blue is hydrated oxide of copper ($\text{Cu}(\text{OH})_2$), and contains sometimes accidental additions of calcium carbonate or carbonate of copper in very small percentages. Its use has many disadvantages, such as lack of covering power when used as an oil color, and its tendency to blacken in the presence of sulphur gases, also its changing to a dull green when used in oil. Damp walls have the tendency to make Bremen blue, when used as a fresco or distemper color, spotted in a short time. The color which shows the least greenish tone, when mixed in oil, is preferred to the other. On account of its showing more or less of this green tone it is or has been often named Bremen green. Owing to its poisonous character and higher cost, it has, during the last twenty or twenty-five years, lost its place in wall paper printing and in fresco or distemper decoration, being superseded by ultramarine green in part, but chiefly by the aniline blues and greens, which when precipitated upon the proper inert bases, such as chalk or whiting, gypsum or alumina silicate, etc., are low in price, yet stronger in covering power for wall decoration, while in wall paper printing the aniline blues or blue greens are used as stainers and are far cheaper in the long run than true Bremen blue. Substitutes for the latter have been made from time to time from sulphate of copper (blue vitriol) in combination with pure liquid calcium chloride, but the result was so inferior that the method was abandoned after a short time. The aniline manufacturers of Germany are producing blues that excel true Bremen blue in beauty and that give all the various color reflexes for which Bremen blue has been noted.

—1522—

Grinding French Yellow Ocher in Oil.

How to keep French yellow ocher from becoming lumpy after it has been ground fine in linseed oil through a stone mill in fairly stiff paste. While paste looks smooth, customers on opening packages find that it has separated from the oil and lumps have formed that are hard to break up.

The trouble may be due to one of several causes. The ocher may contain too much moisture, or may not be mixed long enough before going through the mill, or the stones of the mill may become overheated, being either improperly dressed or run too tight or at too great a speed, which would ward up the oil too much, gumming up the paste to some extent on cooling. All earth paints, no matter how well dried before packing on the other side of the Atlantic, are apt when in transit across the ocean to absorb moisture to a greater or less extent, and unless

the packages are stored on arrival in a dry, warm place for some time, it is necessary to place the material on drying pans that may be heated by exhaust steam or in some other manner without, however, having the temperature above 130 degrees F., so as not to injure the color of the pigment. This will drive off excessive moisture, and earth paints so prepared will mix much more readily in oil, require less oil and grind out more smooth and uniform. Excessive heating in the mill will readily injure the tone of a pale yellow French ocher, giving a reddish tinge to the color, due to partial calcination. The mill stones best adapted for its grinding are French buhr dressed so as to allow the paste to pass freely to the face of same, and the mill should be run at a speed commensurate to the diameter of the stones, which must not be tightened too much, but slackened rather as the stones become fairly warm. When grinding large quantities it is best to run the product into mixing cans, so that any lumps that may form can be broken up and the mass be cooled under a power mixer before placing into packages for distribution to the trade. Some paint mills are arranged by having such a mixer in front of them, although this arrangement is not always convenient. At any rate, it is bad practice to grind directly into large packages, unless provision can be made to have the material cooled by stirring while the package is being filled. This applies to siennas, umbers, Venetian reds, mineral browns, etc., as well, but in the greatest measure to ochers and raw sienna and raw umber.

—1523—

Determining Presence of Aniline in Chrome Red.

Chrome red, or as it is sometimes called, American vermilion, is a basic chromate of lead of scarlet color and the most permanent of all so-called vermilions, though not the brightest. But when an attempt is made to enhance its richness by coloring with aniline red it stands to reason that on exposure to strong light it will not retain that richness for any length of time. To test for the presence of aniline place a little of the suspected article in a test tube, adding some 95 per cent. alcohol, shaking the tube vigorously for a minute or so, then let it stand a while to permit the pigment to settle. If the spirit remains colorless then there is no dyestuff present, but if it appears to be colored red or pink you may be sure that the pigment has been dyed. To make certain drop some of the spirit on a white blotter and if aniline is present it will show as a colored ring around the evaporated drop.

—1524—

Zinc White (Oxide of Zinc) and Its Many Uses.

Aside from its use in interior and to some extent exterior painting, zinc white, i. e., zinc oxide, Zn O , is largely employed in the color of india rubber goods and fancy leather, in glass making, where it serves in the preparation of white glass, in potteries, where it is used to make the white glaze for china and other earthenware, and for ornamentation of same.

It is used as a good white pigment in printers' and lithographers' inks, in calico printing, in the preparation of shoe creams for canvas and white kid shoes and even finds its way into gloss starch for laundries. For the preparation of paints for toys it is indispensable on account of its non-poisonous character. For the polishing of optical glasses it is also a good medium. In the making of some chemical colors, such as zinc gray, zinc green and zinc yellow, it forms the base; also in the making of imitations of Schweinfurt (paris) green. In the pharmaceutical industry it serves as the base for many face powders, cosmetics and salves. Zinc ointment is so well known as a quick healing preparation that it is hardly necessary to mention it.

Zinc oxide is very frequently employed in the preparation of white cements for many purposes, and dentistry has long recognized the value of zinc oxide in filling teeth. When zinc chlorid, another zinc salt, is mixed with zinc oxide in the

right proportion it has the property of producing a very hard and tough white mass. According to a Danish patent zinc oxide can be used for the impregnation of gas mantels. It also forms the binder for asbestos roof shingles when it is used at red heat and moistened with solutions of zinc chloride or a chloride of some other metal.

—1525—

How Green Bronze Is Manufactured.

When speaking of bronze or bronzing it is not very clear what is meant thereby. The term derives its name from the Italian word "bronzino," signifying burnt brown; but in commercial usage it means all colors, whether it is obtained on a surface or article by dipping in a solution or by dusting it thereon in the form of powder, or mixing the latter with a vehicle or medium and applying it like a paint or varnish with a brush. Bronze powder is finely pulverized metal or powder, having a metallic base, used for imparting to various articles a metallic color or luster. Bronze powder can be obtained in any degree of fineness and in imitation of gold, silver, copper, many shades of red, green and even blue. They are made from copper, iron, zinc and tin. The powdered metal is prepared by grinding and heating with oil, grease, wax, paraffine, etc., and the resulting superficial oxidation produces the bronze effect. Green bronze is made from copper made in solution by acetic acid and precipitating it in a state of fine division. Very rich green bronze powder has been found colored with aniline green. Most bronze powders are imported from Germany and England, though a bronze powder works on a large scale was started in Elizabeth, N. J., some years ago.

—1526—

Adding Zinc Oxide to Lithopone.

The addition of zinc oxide has been often suggested to make lithopone more resistant to strong light, and, in fact, the suggestion is made use of in practice to a great extent by many paint makers. The theory is that zinc oxide does not discolor by exposure, and that it resists the action of sulphur gases, and that because of this characteristic a paint made from lithopone with the addition of a fair portion of zinc oxide should remain white much longer. Theoretically the idea should appear correct, but in practice the addition of zinc oxide has its drawbacks, the most important of which is the comparatively lesser durability of zinc oxide as against zinc sulphide. The apparent success obtained by mixing zinc oxide with lithopone is at once a failure when such a mixture is thinned with a varnish vehicle. Every one who has made such a white paint has found that undue thickening of the material results when a lithopone containing large percentages of zinc oxide is the base of a varnish gloss paint. In that case so much varnish is required to obtain proper flowing consistency that the covering capacity of the paint is greatly diminished, or, if volatile thinners are used, the gloss is impaired and a semi-flat paint is the result.

—1527—

Keeping Zinc White in Oil in Good Condition.

Give an idea as to how zinc oxide in oil, ground in paste form, can be kept in containers for any length of time. Zinc white in oil will form a hard crust under water, as it also will when exposed to the air, when not covered with an oil film. If oil is placed over the top of the paste in the container, there is quite some waste in removing the top that has softened, and when the oil becomes mixed with the top layer the paste is not of uniform stiffness for flat work.

We are well aware of the trouble encountered in this connection, and have noticed zinc white in paste form not only forms a crust where exposed to air, not only in open containers, but also in kegs or in tin pails, but also becomes

hard to the depth of several inches from the top, so hard, in fact, that it could not be broken up by hand, but had to be run through the mill. There is a very simple and really inexpensive way to overcome this. When the paste is kept in stock in such containers as tubs, kegs or barrels, the top of the paste is leveled off with a suitable trowel and skimmed over with a very thin film of the oil that the paste has been ground with. Then sheets of oiled paper or of so-called parchment paper are laid over and are pressed down firmly over the top, so that air cannot get in underneath. When it is desired to remove some or all of the contents of the container, all that is necessary is to remove the paper and lay it aside for future use, take off the thin film of oil and reserve it for the same or other purposes, and the paste will be found of proper stiffness with but trifling or no waste. If all is not removed from the container, the balance is once more leveled down and oiled and protected by the paper, as before.

This same method of precaution also applies to all paste whites that contain appreciable portions of zinc, especially when such pastes are ground rather stiff. When materials of this sort are put up in tin pails or steel cans, a disk of oiled paper pressed down on top of the paste previous to the closing of package will prevent skimming over or forming crusts, thus doing away with waste. The paper can be had at moderate cost in disks of suitable size or diameter, and it requires but little time to place it in the package and press it down on the paste.

—1528—

Is There Really a Paint That Is Actually Fireproof?

We must say "No," if you have in view a paint that has oil of any kind for a binder or medium, and generally speaking, there is no fireproof paint in existence. But there are coatings that are termed paint, though they do not contain oils or varnishes of any kind and some of these are, if not fireproof, fire resisting to quite a degree. But the best of these will not resist fire, when the temperature reaches a height where dry distillation begins. When wood begins to give off gases nothing in the line of impregnation can arrest its burning. The value in fire resisting coatings must be looked for in the fact that they hinder the fire from gaining the headway it would otherwise have.

A solution of 10 pounds ammonia phosphate and 1 pound boric acid in 100 pounds of water is said to be very efficient for impregnating wood against fire. Tungstate of soda and sulphate of ammonia dissolved in five times their weight of hot water are known to be so. Other salts of soda, alum, chrome alum, phosphate of soda, zinc chloride and sodium sulphate.

Pigments, such as asbestos, barium, gypsum and whiting are favorites for which fire resisting paint, white earth colors that are alkali proof are used with one or more of the salts mentioned, or rather their solutions, as mediums for colored paints or coatings.

—1529—

French Ochers and the Meaning of Brands.

French ochers are branded as to color, tone, shade and quality by letters, each of which has a distinct meaning. They are not really intended to designate any standard, but to give the consumer a certain guide as to purchasing value. It is for the consumer to protect himself by asking for samples and testing the same in comparison with such standards as he may have, before purchasing in quantity. The letters are the initials of French words as follows:—J stands for *jaune* (yellow), F for *fonce* (dark), L for *lavee* (levigated), S for *surfine* (superfine), E for *extra*, *superieur* or *superior* and C for *claie* (pale or light). So, for instance, J. F. S. means yellow dark levigated superfine, while J. F. L. E. S. means yellow dark levigated extra superfine. When the letters are confined to J. F. it simply means dark yellow, or J. T. L. would mean dark yellow washed ocher. When the letters are J. C. L. S. it means that the ocher is designated as

citron yellow washed superfine, and J. O. L. S. means yellow golden washed superfine, the O. standing for or (gold). When the brand designates French ocher as R. L. S. it means red washed superfine, R. standing for rouge (red). R. L. S. would mean dark red washed superfine.

—1530—

Benzol in Stains and Paint.

Can 160 per cent. benzol be used in place of turpentine for flatting white lead, so as to make a perfect stipple without flashing in spots? Also can a surface coated with a flat color that has benzol for a thinner be painted over with oil color without risk of having it peel off in time?

We would strongly advise against the use of 160 degrees or any other benzol in place of turpentine for flatting white lead or any other paint. Benzol is a distillate of coal tar and a strong solvent, on account of which characteristic it is used with other solvents in the present day paint and varnish removers, although not of the same degree, but of the 90 per cent. variety. For flatting white lead we strongly advise you to stick to spirits of turpentine, but if you must have a cheaper means for flatting your paint use one of the lower priced substitutes made from heavy petroleum spirits; that is known to do the work perfectly in interior flat wall finishes. As to using it in flat color that is to be repainted afterwards in oil color the same applies: that is to say, it is risky to use benzol of any degree for flatting the color, as it is liable to bloom out in spots and throw off the top color. Benzol used in a stain for certain kinds of wood in penetrating the wood, but it must be used in moderate proportions, 10 per cent. of the total portion of solvent being the limit.

In short, benzol is simply a solvent, but not a thinner for paint of the ordinary type and should not be used in place of turpentine or turps substitutes or benzine.

—1531—

Best Method of Mixing Lampblack with Water.

It depends very much upon how well the lampblack is calcined—that is, on how well the empyreumatic matter is removed. In true lampblack that is made from waste oils every trace of the oil must be removed in the process of combustion and subsequent further calcination, otherwise the lampblack, when ground in drying oil, will not dry well when made into paint and will not mix with water, but will keep on floating because of this greasy substance. To test dry lampblack for the absence of unburnt oil, place a small hillock on a piece of perfectly white blotting paper and with a glass dropper wet up the lampblack with alcohol, or, still better, a mixture of ether and alcohol, until it is saturated, when the excess of spirit will bleed out, forming a ring or halo about the hillock of black. If this halo remains perfectly colorless the black is free from unburnt oil, but when the latter is present the halo will show more or less of a yellow or light brown discoloration, according to the quantity present.

By making this test and selecting the lampblack accordingly it is not so very difficult to make the mixture; still there are a few points to be observed in order to facilitate matters.

One of these is to have a good kneading apparatus, or a slow-running mixer, into which a portion of the dry black is placed and the water poured over it slowly, while the machine is only started after the black has had time to absorb some of the water. Then add more black gradually and balance of water only when absolutely required to obtain a pulp or paste of the desired consistency. Never place the water into the apparatus first, and in using a power mixer have it of slow speed. If the pulp is wanted for a purpose where a binder, such as dextrine, soluble starch, gum, Turkey red oil or soap, is used at any rate as, for printing or stamping, it will facilitate mixing when such binding medium is dissolved in a portion of the water used in forming the pulp.

—1532—

Natural Barytes and Artificial Barytes.

Natural barytes, also known as heavy spar, is found in nature in the form of pebbles or lumps of various size, mingled more or less with earthy material, but often also in clear crystal form, free from earthy substance, in which case it is only necessary to crush and pulverize the mineral by grinding either dry or in water. In the latter case it requires drying and disintegrating. When mixed with more or less earthy matter or when discolored by the presence of iron oxide, it is necessary to grind it in water and float off the foreign gangue, bleaching the residue with sulphuric acid in order to remove all coloring matter, then drying the pigment and disintegrating it, as before noted. Natural barytes in well prepared form has an average specific gravity of 4.7 and serves many purposes outside of color and paint manufacture. In the latter it serves as a substratum for colors that without its presence could not well be employed in paint for several reasons. First, because of their great absorption of vehicle and consequent lack of filling capacity, and second, because of their too high cost if used alone for ordinary painting. Barytes, although of lower specific gravity than lead carbonate, does not require a greater portion of vehicle to make a paste than the latter. This applies, however, to the natural product only, while the artificial barytes, known as blanc fixe or baryta white, is much lighter in specific gravity, of greater fineness and whiteness than the latter and requires two and one-half to three times as much vehicle to make it into paste. Artificial barytes, or as we know it, blanc fixe, is, when well made, a pure white, heavy tasteless powder and consists, as does natural barytes, of barium sulphate (Ba SO_4), containing in 100 parts, 65.7 parts by weight barium oxide and 34.3 parts by weight sulphuric acid. It is prepared by precipitating a soluble barium salt, mostly barium chloride, with sulphuric acid, or by precipitating with a low-priced sulphate, such as Glauber's salt (sodium sulphate) and washing the precipitate. Most of the blanc fixe of commerce is sold in the paste form (moist).

Blanc fixe is like natural barytes, permanent, and can be used with any other pigment without in any way affecting its tone perceptibly or detracting from its durability. When mixed with water it dries out in an opaque film, while with oil it is semi-transparent. It can be employed in water painting, fresco and distemper painting, also with casein and water glass paints. It is the principal part of lithopone in combination with zinc sulphide, and is employed by color makers as a substratum for the better class of lakes and chrome greens. Of course, as a cheapening medium for combination whites, commercial chrome greens, chrome yellows, low priced vermilion, permanent reds and substitutes for red lead, blanc fixe cannot compete with natural barytes when prices are considered.

When barium sulphate has been employed as a constituent of paint, the chemist will not be able to determine by analysis whether it was introduced in the natural or artificial form.

—1533—

Mixing a Rich Bronze Green in Oil.

True bronze greens should be made from orange chrome yellow, drop or ivory black and a small portion of burnt Italian sienna. It should, when painted out, show a bronze luster in the sunlight. However, times have changed somewhat and the trend of the times is to have bronze greens decidedly green, very near the tone of bottle green, and to make a good sharp bronze green of the most favored tone is to use a good commercial brand of chrome green, drop black and burnt Turkey umber or burnt Italian sienna, all ground fine in oil, selecting the proper shade of chrome green to make either a light or dark shade. The umber or sienna can be omitted, but black is an essential part of bronze and bottle greens. Lampblack, however, imparts a certain dullness to these greens

and gasblack makes them too brownish in tone. In mixing these composite greens a good portion of a good strong drying japan must be added, as drop or ivory blacks dry very poorly.

—1534—

Substitute for Red Lead.

Under the term red lead substitute the trade understands barytes that has been colored with a coal-tar derivative such as para orange or lithol red G G, and the material has no connection with red lead in any other way excepting that in its dry state it resembles red lead in color. No one that understands the nature of true red lead needs to be misled by the substitute, as a simple test will reveal any deception. A pinch of the substitute dropped into a glass test tube half filled with sulphuric ether or chloroform will color the liquid deep orange or red on the instant, while red lead will give off none of its color. In the same way may be tested some of the spurious red leads sold in the dry state under fancy brands that contain 30 to 50 per cent. by weight of red lead, the balance being composed of the substitute referred to above. These fancy so-called red leads cannot be produced any other way and show the bright red color. It is a practice that should be condemned, because pure red lead is none too good for the protection of iron and steel, and it stands to reason that these substitutes are unable to perform the function of the pure article. Where the desire is simply to obtain the same color effect, and protection against corrosion is not the object, it does not seem to be necessary to borrow the name of red lead for the imitation, therefore it looks like deception on the part of the producer.

—1535—

Permanent Chrome Green, Alkali and Heat Proof.

Is it possible to obtain a chrome green that is absolutely permanent to strong light and also unaffected by alkalis and high degrees of heat?

The general trade name or term chrome green, as known in this country, applies to a mixture of Chinese or Prussian blue and lead chromate in varying proportions, but these greens, while fairly durable under ordinary conditions, do not resist the action of acids, alkalis or high temperature.

The green you have in view is known to the trade as chromium oxide green, i. e., the oxide of the mineral chrome— Cr_2O_3 . This pigment is produced by mixing red bichromate of potash $\text{K}_2\text{Cr}_2\text{O}_7$, with one-eighth part of its weight of brimstone and burning the mixture in a retort. The resulting green material is a combination (or mixture) of chromium oxide and sulphate of potassium and must be boiled in water to remove the potash salt, and the remaining chrome oxide must be calcined in order to remove all remaining portions of free sulphur. The product so made is a dense, heavy pigment of a rather dull, mostly olive toned green of excellent opacity, great permanency, non-bleeding in water, acid alkali and heat resisting, is used by glassmakers, in porcelain painting, enameling, rubber making and coloring cement. For paint it cannot be surpassed as to durability, but its price is rather high and the tone of the color dull as compared with the ordinary chrome greens.

Another higher grade of this green, very brilliant, but also very transparent, is the hydrated chromium oxide of the formula $\text{Cr}_2\text{H}_4\text{O}_5$, more generally known as Guignet's green, by whose method the pigment has been made for over seventy years. It consists of an intimate mixture of three parts by weight of bichromate of potash and eight parts of boric acid, which is carefully heated to a cherry red, when a green cake forms, from which boiling water extracts borate of potash and the residuum consists of Guignet's green.

If the pigment is treated at a higher temperature than above mentioned, it loses its water of hydration and thus resembles the dull green of the chromium oxide.

Guignet's green is known to artists as Viridian and Vert Emeraude and is used in calico printing, wallpaper printing and in the ceramic art. On account of its high price, however, the demand is comparatively small.

—1536—

What Is Understood by Torbay Brown?

Answer: Torbay brown is the name of a very low priced paste paint ground in oil that we think was originally manufactured and so named in England, it being usually asked for by British mariners. A sample of the goods sold at a rather low figure at Boston, Mass., that we had analyzed proved to consist of 8 per cent. sesquioxide of iron, 44 per cent. barytes, 22 per cent. carbonate of lime, 4 per cent. lead chromate, 10 per cent. aluminum silicate, 9 per cent. linseed oil and 3 per cent. free water, which corresponded to about 44 per cent. barytes, 22 per cent. whiting, 4 per cent. medium chrome yellow, 11 per cent. cheap yellow ocher, 4 per cent. burnt umber and 3 per cent. burnt sienna (or red oxide), a total of 88 per cent. dry material, ground roughly in 9 pounds linseed oil and enough water to result in 100 pounds of paste of a medium brown color. We think this will give you a general idea of the quality of the goods, and you can draw your own conclusions.

—1537—

Resinate of Lead and Resinate of Manganese.

Resinate of lead is prepared by melting either pale or dark rosin and introducing into the melted mass under continued agitation with an iron or steel stirring rod or paddle varnish makers' litharge, until the mass becomes so stiff that it will take up no more and the lead oxide is thoroughly mixed with the rosin, which can be ascertained by dropping a portion of the semi-liquid mass on a strip of glass. As much as 12 pounds of litharge may be thus taken up by 88 pounds of rosin. To ascertain actually how much litharge should be used, it is best to first make a batch with an excess of litharge, weigh out a small portion of the resulting product, dissolve this in spirits of turpentine and determine the weight of the lead that settles out, which will show the extent of the excess.

Resinate of manganese is made cheapest by using the powdered gray or black oxide of manganese in the same manner as litharge is introduced into the melted rosin, but the process is much slower, the manganese being lighter in gravity and very apt to ignite and set the whole mass on fire, unless the kettle is walled in. The limit is $7\frac{1}{2}$ pounds manganese to $92\frac{1}{2}$ pounds rosin. Any excess of lead or manganese in either of these resinates will precipitate on dissolving them in turpentine or benzine.

—1538—

What Is Stone Color or Stone Gray?

When a color on a sample card is designated as stone without such a prefix as gray, green or sand, it may be of a bluish gray, brown or slate type, but when named stone gray it should be as close to the natural sandstone as possible, with a greenish-gray effect. The base may be white lead, zinc oxide, or a mixture of these, or lithopone white alone, and this base may be used pure or extended with inert mineral bases and tinted with lampblack until a neutral gray tint is obtained, to which is added, in very small portions, chrome green, yellow ocher and a trifle of red oxide. When a yellowish tone is preferred in stone color, the lampblack is omitted, while for sandstone, chrome green is omitted; but for green stone, more chrome green is used than for stone gray. For a reddish gray stone color, black and red only are used, with perhaps a trifle of yellow ocher. Brown stone color is made by tinting the

white base with lampblack, Venetian red and yellow ocher. It is self-evident that there is no standard for stone color, because stone has such a great variety of colors.

—1539—

Discoloration of Gloss Enamel White.

Gloss white used on the inside walls and the ceilings of cotton mills will turn yellow in a short time, but this is only natural when it is considered that mill owners will not pay the price for a superior article. The price at which mill whites are sold does not permit paint manufacturers to use the best French process zinc and high-grade pale varnish in either the gloss or the flat mill white, the consequence being that even if the lithopone white does not discolor on interior work, the cheap varnish that must necessarily be employed is bound to darken, causing the white to yellow off at an early date. Even in the finest residences, where cost was not considered, it has happened frequently that white enamel became yellow in a short time, especially at places where the light was not strong. Flat white paint is not affected so readily, because there is a great deal more pigment to the square foot of space than there is in a gloss white. Eggshell gloss white will naturally be a happy medium between the flat and the high-gloss paint.

—1540—

Oil Foots, Varnish Drips and Varnish Bottoms.

Oil foots are had from several sources. When linseed oil is placed in storage tanks, without being previously treated by filtration, etc., the mucilagenous or slimy substance will go to the bottom of the tanks and, the clarified oil being drawn without touching the bottom, the so-called foots must be drawn from time to time, otherwise the oil would be cloudy throughout. These foots do not make a good drying substance, but by proper manipulation can be made use of in certain cements. Oil or varnish drips are simply the accumulation of the cleaning of kettles, filter presses and drippings from stop cocks and faucets, while varnish bottoms consist of the settlings of varnish in storage tanks, and the constituents depend entirely upon the grade of varnish stored in the tanks. The chief portions of these bottoms, so-called, consist of the driers used, such as litharge, manganese, etc., with the impurities of the gum, probably some linseed or China wood oil, turps or benzine.

—1541—

Lithopone White and Sulphopone White.

We are indebted to Dr. Sacher, of Dusseldorf, who has published the history of such a pigment in "Farbe and Lack," for the information that there was a patent issued in Germany some years ago for the production of a pigment, named sulphopone by Dr. Steinau, the inventor. The process was described as follows:—A solution of zinc sulphate and a solution of calcium sulphate are precipitated in molecular weight relations at 45 degrees Centigrade and roasting the resulting mixture of zinc sulphide and calcium sulphate at a temperature of 300 degrees Centigrade. The pigment is not in commerce at the present time, probably because it could not compete with lithopone in covering capacity or body.

—1542—

To Keep Bronze Green Paint from Flatting.

A painter recently painted a house dark green. It was a job of repainting and he used equal parts bronze green paint and dry chrome green, thinning with boiled oil. In the first coat he used about 15 per cent. turpentine, while in the

second coat he used what he calls "an equal portion of a good lead and oil paint." The green paint so made went in flat in many places on both first and second coat, more so on the old portion of house than on the new additions, and it also blistered on the old portions, where the sun hit it before the paint was thoroughly set. He desires to know whether the addition of the lead paint was the cause of flatting and how a good dark green paint should be mixed to stand up with uniform gloss.

In the first place, you should not have added any dry green to your bronze green paint and you should not have mixed that lead and oil paint with the green, because if that bronze green was any good at all it should have had ample body to cover well with two coats over old or new surface. If your bronze green was too dark in shade you could have made it lighter by the addition of chrome green in oil or chrome yellow in oil. The addition of turpentine in the paint for the first coat over the old surface was all right, it being good practice to use turps in the first coat in repainting old hard surface, but the addition of the lead and oil paint was utterly wrong, as this and the use of the dry green was the cause of flatting in spots. To make a dark green paint that will dry uniform in finish, thin down a good commercial chrome green, ground in pure linseed oil, with raw linseed oil and add sufficient lampblack, also ground in oil, to produce the depth of color desired and add a small portion of a good liquid drier, omitting turpentine in the finishing coat.

—1543—

Utilizing Linseed Oil Skins.

Linseed oil skins, no matter how old they may be, will dissolve readily when boiled in raw linseed oil and impart body or viscosity to the oil. They may also be dissolved when boiled with a liquid portion of linseed oil fects, but the temperature should not be raised over 392 degrees F. at any time. It is safer to boil for a longer time, keeping the material well stirred.

—1544—

Mixing Paint to Produce a Job of High Gloss and Durability.

This depends to a great extent on the base of the paint, as well as on the vehicle or medium used for thinning the paste base. If too much stress is laid on covering or hiding power the paint cannot be expected to dry out with high luster or gloss, because this effect is produced by the amount of oil used, whereas, on the other hand, if the finishing coat is used with a liberal quantity of oil of good body (genuine boiled oil) and without volatile thinner, the gloss and durability will certainly be greater than when the reverse is practiced.

—1545—

Effect of Zinc Oxide in White Lead Paint.

What effect does from 15 to 20 per cent. of zinc oxide have in white lead paint? Does it improve the gloss? Or the wearing quality? Will that percentage of addition of zinc to white lead eventually produce a surface that will not be good for recoating?

In using white lead paint we see no objection to the addition of the percentage of zinc oxide mentioned. On the contrary, it has been proved a distinct advantage to prevent the chalking of white lead (basic carbonate of lead). But we do not consider the addition of zinc oxide beneficial when the white lead paint is used as a first or priming coat for new wooden surfaces on exposed work. There is no question that the addition of zinc oxide does improve the gloss of the paint, because the addition of the zinc oxide requires more oil for spreading. As far as improving the wearing quality of white lead paint comes into question, it is a matter of local conditions, the addition of zinc oxide being most beneficial in salt air atmospheres and among factory localities, as well as along the lines

of railroads. The percentage of zinc oxide referred to will not interfere to any extent with the eventual recoating of the surface. For mixing with white lead we do not consider French process zinc oxide superior to the American process zinc manufactured by the company referred to.

—1546—

Colored Asphaltum Paints; How Prepared.

Wanted to know how carbon black may be introduced into asphaltum paint or varnish to make it a more intense black. Also what should colors be ground in for coloring asphaltum paint brown, gray, green and red.

Grind carbon black in such oil as you fuse asphaltum with and use the black in oil, instead of the regular medium. This will obviate the necessity of running the carbon black and asphaltum paint through a mill or the use of a mixer. As to colors, it is best to grind the dry colors in boiled linseed oil to a soft paste that will readily mix with your melted product. To make a brown asphaltic paint, you will have to use a mineral red, but you cannot make a good red with asphaltum. Neither can you make a fair gray, as asphalt is too brownish, and when mixed with white to produce gray it is but a very dull affair. For green you will have to use a chemically pure chrome green, otherwise you can use but very little asphaltum.

—1547—

Proportion of Silica in Graphite Paints.

Amorphous graphite such as is used in the manufacture of graphite paint always contains certain percentages of silica, but the variation is very great. Siberian and German, as well as some of the Lake Superior graphites, carry anywhere from 35 to 50 per cent. silica, along with about 10 to 15 per cent. clay and very little iron, therefore the addition of silica when making it into paint is not necessary. Artificial graphite, which is nearly pure carbon, is not stretched with silica in making paint, but when extended, the material used is of lighter specific gravity, such as slate flour, soapstone, talc or magnesium silicate, because added silica makes the paint become hard after settling to the bottom of the package. We do not believe that any one would use silica to give a higher melting point to asphaltum, but asphalt is mixed with sand for specific purposes.

—1548—

Dissolving and Utilizing Paint Skins.

Into a good tight barrel, place about fifteen gallons of water and two pounds concentrated lye, also about five pounds of unslaked lime. Stir until the lye and lime are dissolved, then put in your dirty paint pails and whatever paint skins you may have and stir occasionally with a strong wooden paddle. When the buckets are clean and the skins dissolved, take out the buckets, rinsing in clear water, let the lye in the barrel settle until nearly or quite clear, pour off the lye water carefully from the top of the sediment, which when sufficient oil and drier is added and the mixture well strained, will do for fences, rough siding or first coating brick walls.

—1549—

Removing Polish from Automobile Body for Revarnishing.

To remove the heavy coating of a sticky film from an automobile body, produced by repeated coatings of a much advertised floor polish in many applications, so that the surface can be varnished and produce a high luster while drying hard:—

As we understand it, the polish referred to is recommended for floors only, and how anyone can use this material as a polish for varnish surfaces on an automobile body is beyond our comprehension. However, as long as people believe that anything will do for every surface, there is no other way but to let them get experience by paying for it. This polish may be good enough as a floor oil, but it is not good for preserving automobile finishes, nor any other exterior finishes.

As to removing the films produced on varnished surfaces, such as automobile bodies, etc., this polishing oil is difficult to remove, because, as we understand its composition, it is chiefly a petroleum product such as paraffine oil and paraffine wax, which will not saponify like linseed oil with lime or ammonia.

Hence the only way to remove this sticky film is confined to the use of a paint and varnish remover of the same type as that which dissolves any paint or varnish in a very short time, an article that is patented and sold under various brands by many manufacturers.

—1550—

Composition of Artists' Color Mineral Blue.

Composition of artists' tube color known as mineral blue:—

The color is usually sold under the name of Antwerp blue, or at least was so labeled twenty years ago. The pigment comprising it was imported under the name of bleu mineral, in drops, from France and Belgium, and was actually a good Chinese or Prussian blue of the miloric tone, reduced with a portion of alumina sulphate, that gave it a peculiar hue, much valued by artists and preferred to any other blue for certain reasons, one of which was its greater opacity and lighter hue in the solid color as compared with Chinese or Prussian blue, while its permanency was equal to the latter. It is ground fine in poppyseed oil or bleached linseed oil, as most convenient to the manufacturer. Many years ago the color offered as mineral blue or mountain blue was a native copper mineral, found in France, Australia and Siberia, and was known as bice or blue verditer, but the introduction of artificial ultramarine and imitation of cobalt blues, which are of far greater permanence and brilliancy, have caused this color to disappear from the market.

—1551—

English Cliffstone Whiting vs. American Paris White.

Kaolin or clay is silicate of alumina, chemically considered, while whiting is calcium carbonate, also known as carbonate of lime. The former will not dissolve in contact with dilute hydrochloric or nitric acid, while the latter, whether prepared from English, French or American limestone, will dissolve in dilute acids with very decided effervescence. We doubt whether any firm would offer clay as whiting and do so for any length of time without detection. The reason for the great advance in the price of whiting during the past three years is readily accounted for by the high cost of transatlantic shipping. The rock from which whiting is prepared for the most part comes from British ports, and not many years since foreign vessels brought it over here in ballast, which enabled American manufacturers to sell at low figures. Commercial whiting, the lowest grade sold, was offered wholesale in 1914 at 45 cents per 100 pounds; in 1915, at the same price; 1916, at 90 cents; 1917, at \$1.10; and this grade is fit only for making cheap putty, containing as high as 15 per cent. sandy matter.

—1552—

Saving Paint Skins For Future Use.

Make it a rule to have your men brush out pots that are nearly empty into a barrel, or keg set aside for the purpose. Then have a large barrel, in which put three pounds concentrated lye and seven and a half pounds burnt lime with

twenty gallons of water. Put all old paint skins and dirty pots or pails in this liquid and stir occasionally. When the skins are dissolved and the pots clean, pour off the lye water for future use and add good oil to the paint in bottom of barrel, using it for rough work on bricks, etc.

—1553—

Silica or Silex. What Is the Difference, If Any?

The proper technical name is silica, the chemical term is silicon dioxide, and the common name is sand; it is really quartz rock. When this pigment is finely powdered, as it is obtained in the water floating process and viewed in the dry state under the microscope, it may show to be in prismatic form, and in that case, it is classed as silex, while when the small particles are round or spherical, it is classed as silica, and in that case it usually carries small portions of clay or talc or asbestos rock, even lime. It is, when pure or nearly so, an inert or neutral pigment, and as an addition for paint it absorbs as large a portion of oil as does whiting, but not as much as clay or talc. Many paint authorities favored silica as an extender for iron oxide red in paint for iron, preferring it to whiting or gypsum, because of its inert nature to these materials. But its principal virtue in paint manufacture was found in its use in paste and liquid wood fillers, because of its hardness and transparency. The chief use for silica, however, is in its adaptability in the making of water glass or silicate of soda or silicate of potash.

—1554—

Van Dyke Brown, Foreign and Domestic.

A painter says:—I have been trying for some time to locate the pigment we have largely used for preparing stains, buying it ground in drying oil under the name of Vandyke brown, which used to give us the best satisfaction in our work. What we are now getting is not at all like what was furnished us up to several years ago. I note in the various price lists published in trade papers, that there are no quotations for dry Vandyke brown, except for domestic quality and should appreciate any information you can furnish on the subject as to why imported Vandyke brown is not quoted, also how the substitute is now prepared.

You evidently have reference to the pigments, that up to the beginning of the conflict in Europe and for about one year after, were so largely imported into this country under the name of Vandyke brown, and which were known to commerce as Cologne or Cassel earth and consisted of soft, impure varieties of brown coal or lignite, named after the nearest towns to the mines or diggings, and the pigments were made less fugitive on exposure by slight roasting in suitable furnaces. The materials were comparatively low priced, which accounts for the ready market obtained for them and the disfavor for goods of domestic origin.

The situation is different now, and our manufacturers find that they can obtain a market for the goods they have to offer. There are now and always have been pigments of practically the same color, which will now come to the fore, that have always been used for painters' purposes in preference, because of their greater permanence, when used with white lead for tints.

This is notably the case with a brown, composed of about equal parts of a finely powdered oxide of iron and lampblack of inferior grade, or one that is composed of 25 parts by weight of lampblack, 50 parts of colcothar or purple oxide and 25 parts of yellow ocher. You will see, however, that the cost of this is considerably higher than that of the domestic Vandyke brown of lists of prices current.

The material there quoted is simply a cheap earth, found naturally and prepared by pulverizing and would hardly do for permanent stains or produce the color you desire, while the mixtures referred to above will be found permanent and strong stainers. There is still another way of approaching the color

and composition by kalsomining cork bark and cuttings and soft chips or sawdust in a closed vessel, which produces a brownish black carbon, that may be brought to the desired brown color with the addition of lampblack and red oxide.

—1555—

Removing Dried Paint from Woolen Cloth Without Injury.

Cover the spots with olive oil or unsalted butter first, let the grease soak well into the spots, then rub with a piece of cloth, well saturated with chloroform. Avoid the presence of a flame or light and have the room well ventilated. Repeat the operation, if necessary. Do not rub hard, but let the chloroform do the work. Benzine and soapsuds after saturating the spots with olive oil or butter will also do the work, when spots are not too old, but the use of soap may take out the color from the cloth. Chloroform is best.

—1556—

How to Eliminate Sandy Matter from Whiting.

Correspondent has difficulty in obtaining whiting that does not show some gritty matter, which interferes with some of his finer work in distemper painting. He would like to know where he could obtain a material entirely free from the sandy substance, and under what name it is offered or if it is not readily obtainable, what he could do to eliminate the gritty particles.

Unless you purchase precipitated French or English chalk, which you can obtain from importing houses in New York City, you need not look for any brand of whiting that is entirely free of sandy matter, because the chalk, when mixed, contains more or less flinty matter, and, while in the best English cliffstone paris white it is eliminated to some extent, there is always, even in the higher priced goods, anywhere from one-half to 1 per cent. by weight present, in more or less fine division; because of its very sharp grit, it will interfere with extra fine work. The grade of whiting sold us, American paris white, has shown anywhere from 2 to 4 per cent. of the substance, while the different grades of gilders' whiting often contain up to 7 or 8 per cent., and common or commercial whiting as much as 12 and even 15 per cent.

Precipitated French or English chalk is simply carbonate of lime, mined from the cliffs, on either side of the English channel, and is freed as much as possible from the flint, and then ground in water, floated, dried and powdered. In floating the finest particles are run off first and the material sold as precipitated chalk. The next runs are also dried and sold either in lump or powdered form, while the coarser residuum is offered as English cliffstone paris white, American paris white, gilders' whiting, Spanish white or commercial whiting.

If you cannot procure the precipitated article and do not mind the trouble, you can take a small portion of any bolted whiting, and triturate with water in any large jar or glass. Use a glass rod or clean wooden paddle, stirring the mixture several times, then letting it subside, when the grit or heavier particles will settle to the bottom first. Have some cheese cloth or fine muslin ready, spread over a frame, on which pour the top of the mixture in the jar, without causing it to mix with the coarser sediment. Let the water drain off and you will have the fine particles as a pulp, which scrape off the cheese cloth and put in a fairly warm place to dry. Then you may put it through a fine mesh sieve. Of course, this is rather ancient practice, but under certain conditions and for certain purposes it is the safest method to make sure that the material is free of grit.

—1557—

Malachite Green or Mountain Green.

Malachite, also known as Mountain or Mineral green, has been used for centuries as a paint material. In its purest state it has been found in many countries, notably in the mines of the Ural regions of Russia and at Burra-Burra in Southern Australia, along with the blue carbonate of copper. Its composition is a combination of hydrate and carbonate of copper, and its specific gravity four times that of water.

To prepare it for use in paint, especially for artists' color, it must be carefully ground, but first selected to make it free of all impurities, such as ochrous veins and azurite. It is liable to blacken when mixed with colors composed of sulphur compounds, as, for instance, cadmium yellow, but otherwise has proven fairly permanent when ground in bleached oil.

As a water color in distemper painting it is not at all permanent, but in oil distemper it has stood well, unless browned by the sulphur in the egg medium or the size. You may obtain true or native Malachite green in artists' tube colors, but, as an article of commerce, for general decorative use, it is practically obsolete. The best Malachite green sold to the trade as a commercial article is prepared as follows:—

Forty pounds caustic soda is dissolved in 120 gallons boiling water and 8 pounds arsenic added to this solution. This boiled for 20 minutes by open steam and allowed to cool. One hundred and sixty pounds sulphate of copper is dissolved in 120 gallons of cold water, and while stirring continually it is run into the soda and arsenic solution, then 9 pounds tartaric acid dissolved in lukewarm water is added, the whole well stirred, washed two or three times, then filter pressed and dried, and the cakes dried at moderate heat.

You will see by this that there is a decided tendency for color manufacturers to sell a blueish toned chrome green under the name of Malachite, simply as a fancy term, so long as true Malachite or mineral green is not guaranteed and the price reasonable. The formula given for the artificial color noted above will yield about 150 pounds of dry green, and when carefully prepared it will be fully as permanent as the native article.

—1558—

A Non-Bleeding, Permanent Brilliant Red.

Wanted to obtain a perfectly non-bleeding, permanent and brilliant red, similar in color and tone to Para nitraniline red, ground in oil or gold size japan, that will serve for car and sign work, and will not bleed through white or pale yellow lettering. Varied experiences with Para reds or so-called non-bleeding reds of the Para type showed, unless lettered work was first varnished and rubbed, the red would bleed through the letters every time.

It is desired to avoid the application of two coats of rubbing varnish and rubbing same, before lettering, and the so-called flatting varnishes did not usually hold back the bleeding.

We are fully aware that many of the reds offered as non-bleeding, while fairly so, when used as full oil coats, will, when applied semi-flat or dead flat, bleed through white or pale yellow letters, due to the turpentine in the lettering color drawing out some of the dyestuff. This is invariably the case in quick-drying coach or sign painting and a source of annoyance to the user.

We understand, however, that by the use of toluidine red, which is fully as brilliant as the best Para toner, the bleeding is entirely overcome. Of course, the high cost of toluidine (the dry pigment being quoted at from \$5 to \$6 per pound) almost prohibits its use in a general way, unless cost is not an object, as it would be in the case of carmine. The color is, however, much more serviceable than the latter and very permanent in comparison.

Some years past the Pennsylvania R. R. system adopted toluidine red, re-

inforced and cheapened by grinding it with a liberal portion of precipitated barytes (blanc fixe), purchasing it in paste form to specifications for use in painting all of their cabin cars and red signals, replacing the American vermilion (scarlet lead chromate) which had been in general use for nearly half a century for the same purpose. You can obtain the color from any prominent color house by paying the price.

—1559—

The Value of Steel Wool to the Wood Finisher and Painter.

We have learned that while steel wool was unknown up to 25 or 30 years ago it was first discovered somewhere in Switzerland by a party who observed painters gathering the refuse arising from the manufacture of reed for looms, selecting the finer grades for rubbing down varnish, metal and wood. Being of an inquiring turn of mind, he examined the material carefully and found that the residue consisted of flat ribbons of steel, the borders of which were planed off and the whole, before being assorted, was an admixture of fine and coarse grades. He saw that there were two main faults with the material so obtained. First, it was impossible to obtain any appreciable quantity of uniform grade; and, second, the temper and quality of the steel was such that only indifferent results could be obtained from its use. After years of study and research he finally designed a machine for the manufacture of shredded steel so uniform in quality and so delicate in texture that he named the product steel wool instead of steel shavings, and the material has replaced sandpaper and other rubbing helps throughout the world, and it may be had in many grades of fineness at a moderate cost. It is useful not alone to woodworkers and painters, but to plasterers and paperhangers, to metal workers—in fact all branches of industry.

—1560—

Drop Black, What Is Its Real Composition?

The drop black, as we know it today, is the product obtained by the grinding of calcined animal bones, either alone or mixed on calcining the bones with animal refuse, waste from horns, hoofs, etc., and which would not pay the manufacturers to put up in drops. Only the old name has clung to the pulverized material. The proper name for what you have in view was Frankfort black or vine black, when in pulverized form, but when being washed after calcination several times, to remove every trace of alkali, the residue was put through a mill with a little glue-water and made in pear shaped drops, which were dried and so marketed. This black was composed of vine twigs and other vegetable matter, and the luster of the black was almost that of real ivory black, while ordinary bone black is not as dense and a somewhat brownish tone.

GLASS AND GLAZING.

—1561—

Glazing Sash—A Good Day's Work.

The question was asked how many 9x12 in. lights a man can put into sash in a day's work, and what is the usual rate per day paid for such work.

When the sash is new and primed, one man should be able to put in 100 lights in a day of ten hours, or 10 lights per hour. The wages paid for such work, if done by a painter, where union rates are in vogue, is the same as for painting, ranging from twenty-five cents to thirty-seven and one-half cents per hour in various cities, and the rate charged or estimated on is five to six cents per light, including priming.

—1562—

Chipping Glass Signs with Glue After Etching with Acid.

A working formula for applying glue to glass after it has been etched with white acid was wanted. Glue from several concerns, who claimed to sell to chipped glass sign makers, had been tried; soaked the glue in water over night and boiled it in vinegar and applied it hot, let it stand over night and heated it to different degrees, but the glue does not act all over the glass.

Try noodle glue, which is said to work best, and make your solution very strong, apply it evenly all over the surface.

A well-known Canadian firm making a specialty of chipped glass signs uses the following process:—The design is first drawn on manila paper, and after being pasted to the glass, the parts of the design intended to be etched are then cut out, and the paper carefully lifted from the glass, taking care not to disturb any of the letters, or other lines that are to be left clear. The glass is then laid flat under a wooden hopper, through which a stream of fine sharp sand is directed upon its surface for several minutes. The force obtained by a fall of some ten feet is sufficient to etch the surface not protected by the paper. The whole surface, paper and all, is next covered about a sixteenth of an inch thick with strong glue, the kind known as noodle glue or white sheet glue being best, which is allowed to dry fairly well at a moderate temperature. The glass is then set on edge in a rack in a dry kiln, which is raised to a high temperature by means of a double row of gas jets near the floor. After staying here for several hours, the glue flakes off in irregular chips, pulling with it the surface of the glass, where it has been etched, and giving it the appearance of frosted work. Any remaining glue is scraped away with a palette knife, and the paper is soaked off, completing the sign. Considerable practice is needed before perfect work can be done.

—1563—

Chipping Glass with Glue.

Some time ago a master painter in the car shops of a Western railroad stated that he has had excellent results in chipping the windows of a passenger car by using glue, but he did not go into details further than to say that he coated the glass with a strong solution of noodle glue, after rubbing down the glass on the side to be coated with pumice flour and water, then cleaning with whiting. Try to obtain noodle glue, which takes its name from the shape of the pieces in which it is sold. Soak the glue in water over night, melt it in the usual way and apply it to perfectly dry glass as hot as possible in a flowing coat.

Try it on small pieces of double thick window glass, warming the glass in one case, in another case apply the hot glue on glass of ordinary temperature; also try it on glass that has not been ground and on glass that is rough ground.

The chipping will not take place unless the glass has previously been roughened by sand blast or etching fluid.

—1564—

Blue Ink for Writing on Glass.

Dissolve bleached shellac 10 parts, Venice turpentine 5 parts in 15 parts spirits of turpentine in a bottle that is steeped in warm water. Add to this 5 parts of finely powdered indigo. This ink will not wash off with water.

—1565—

To Keep Plate Glass Store Windows from Sweating by Frost.

It was desired to know what could be done to prevent plate glass in store fronts from frosting or sweating. Holes in bottom and top of frames had been tried with only fair success. Had heard that alcohol is used sometimes, but do not know how it is applied.

To prevent windows in store fronts from sweating and consequent frosting in winter, liberal ventilation is required. Boring holes in the frame alone will not suffice, a ventilator several inches in diameter or larger should be placed in the top of bulkhead of the front. The use of alcohol is only a temporary expedient, as it will not serve to keep the glass clear for over twenty-four hours. The glass must be cleaned first, wiped thoroughly dry and the alcohol applied with a sponge that is moistened with it and permitted to evaporate. It is essential, also, that the window should be shut off from the store by a close fitting sash.

—1566—

Will Paint Applied to Plate Glass Cause the Glass to Crack?

A sign writer of Canton, Ohio, asked if it is possible that black paint applied on the inside of a plate glass store window to act as a screen and sign will cause the glass to crack and break, when it contracts and expands with heat and cold. A glass salesman claimed that it would do so. The black paint in question is carbon black in oil, reduced with spar varnish and gold size.

In our opinion there is not enough contraction and expansion to do any harm when the plate glass has not been forced into the frame to cause the glass to crack or break. If anything would crack or tear apart from such action, it would be the paint and not the glass. We should like to see the paint that would be so tenacious and strong as to break or even crack plate glass without going to pieces first.

—1567—

Plate Glass Breaking from Being Backed Up Solid with Color.

An expert sign writer from Logansport, Ind., writes us that we were of the wrong opinion, as his long experience had taught him differently. He has lettered a good many fancy gold signs on plate glass windows and backed them up with solid colored background, and has found in every case where the window faced the south that the glass would crack in the center and from one side to the other. In some cases the glass would crack before the background had time to dry, which he explains as being due to the fact that the color draws the heat more than does the glass. Several other experienced sign writers corroborate our friend's statements, saying that plate glass has been known to crack after lettering, even where there was no solid background, but they attribute the cracking to the haste

in which the backing up is done, not giving the various coats of color and varnish time to thoroughly dry before applying the next. And we fully agree with them in this opinion.

—1568—

A Painter's Experience with Breaking Glass.

I will give my experience. I have lettered a good many fancy gold signs on plate glass windows where they were backed up with a solid colored background, and have learned that in each and every case where the window faces the south where the hot sun will strike it that the glass will crack right through, about the center of the whole sign, and from one side to the other of the glass. I have had five different windows crack from that cause, and in one case the glass cracked in less than ten minutes after the solid background was applied, as the sun was shining on it at the time and the color drew more heat than the clear glass did, and, of course, caused an expansion through the body of the sign that the other part of the clear glass did not get or could not stand, and it popped like a gun. It was a heavy glass and cost \$145 to replace, but it was insured.

I had also one to break in cold weather, in the winter. And I positively know that the cause was from the sign.

Now I refuse to put up any more facing the sun. I have had one of those top border signs, used so much at the top of store windows, which are only about fourteen to eighteen inches deep from the top of glass, to break from the sun, and it faced the west and only got the sun from 4 o'clock on.

The color does not make any difference, nor does the kind of paint that has been used. So my experience has been against solid background signs on plate glass where they face the south.

F. W. Potter, Logansport, Ind.

—1569—

Another Case of Glass Breaking.

We have had occasion within the last few months to replace three large pieces of plate glass in three different fronts. The cause of the breakage was the black paint used to back up the gold leaf signs. Perhaps in the northern countries where the sun is not strong signwriters would not feel the effect as much as in warmer climates. A patch of black paint across the middle of a plate glass will absorb heat enough when exposed to the sun's rays to crack the glass and often to shiver the whole plate. The reason is plain: the black absorbs the sun's rays until the glass is so hot on that particular spot that a person cannot bear his hand upon it. The consequence is uneven expansion of the glass and something has got to give way. It is on the same principle that if a gaslight is swung against a light of glass, so as to heat it in one spot, it will break. We have seen plate glass as badly broken from this cause as if there had been a fire across the street. When not exposed to the sun's rays the black paint will do no harm whatever.

—1570—

First Coat for Painting on Glass.

What is the best first coating or size for painting on glass, gloss or flat finish? Will oil and lead paint adhere well on glass?

A paint made with white lead, linseed oil and turpentine, applied to clean, dry glass, will adhere very well, provided it is not afterward subjected to steam vapors or other condensed moisture to any extent. Colors or paints of lighter gravity than white leads are best mixed with good coach varnish and turpentine or benzine for first coat, and a little coach japan added will hasten its hardening. The principal condition for adhesion is perfect cleaning of the surface before applying first coats.

—1571—

Glaziers' Putty That Will Not Crumble Nor Give Trouble in Reglazing.

Although there are still some pure linseed oil and whiting putties on the market, you have evidently had none of them. Most putty is made from a mixture of whiting and marble dust, or marble dust and putty oil alone, and you may imagine what putty oil is. The latter is a substitute for linseed oil to be used in making putty and may be recognized by the grease it leaves on top of the putty after glazing. The compounds made of marble dust may be identified by the shortness of the article and its lack of elasticity in working under the knife. The presence of putty oil (mineral oil, etc.) can be detected by the odor, when a small portion of the putty has been rubbed briskly between the hands. If you cannot obtain pure linseed oil and whiting putty under a guarantee, prepare it yourself as follows:—

Have some fine bolted American paris or bolted gilders' whiting on a strong bench, mixed with raw linseed oil and knead it into a stiff dough. Add all the whiting you are able to get into it and pound it with a club or mallet for some time, until it is thoroughly kneaded. Lay it aside in a warm place exposed to the air of the room for three or four days to sweat; then put back on the bench, knead and pound again, until it is good and pliable. If too soft add more whiting, but no more oil. The kneading, pounding and subsequent sweating is the most important feature in producing good putty. The usual proportions are 85 pounds whiting to 2 gallons of linseed oil.

—1572—

Putty for Glazing Sash of Cast Iron.

Pure linseed oil and whiting putty mixed with some dry white lead and a little japan, thoroughly kneaded, is the best material. Or, if you have any oil paint skins about the shop, run them through a paint mill until fairly fine, then mix with bolted whiting fairly stiff and pound with a mallet or knead very thoroughly. But before putting in your glass prime the sash with good paint, half flat.

—1573—

Frosting Glass Without the Aid of Sand Blast.

You can frost glass by rubbing over it with a small bag of muslin filled with fine sand or powdered glass, also with grindstone grit and water. Another way of frosting glass is to first wipe the glass clean and dry, then dampen with hydrofluoric acid until frosted enough, finally rinsing well with clear water. The hydrofluoric acid must be kept in leaden or gutta percha bottles and when working with it the hands must be protected with rubber gloves. White acid for frosting or embossing glass is composed of one-third fluoric acid and two-thirds liquid ammonia and must be kept also in leaden or gutta percha bottles.

—1574—

Chipping Glass with the Aid of Glue.

The most effective method of chipping glass is accomplished by the use of the sand blast, all others being more in the amateur line at this time. However, some persevering, practical men have had good results by roughening the glass with sand and water or emery and water, then thoroughly drying the glass after cleaning same. This done, noodle glue that has been soaked in water overnight was melted and applied as hot as it could be made without scorching to the roughened side of the glass in a heavy flowing coat. Then the glass is placed in an oven with a high temperature of at least 480 degrees Fahrenheit, when, after several hours, the glue will come off in irregular chips, pulling off the roughened surface of the glass, giving it a frosted appearance.

—1575—

Boring or Drilling Holes in Glass.

There are several methods that will do the work quite rapidly providing the drills are properly made and tempered. The usual steel drill, spear-pointed, is said to be the best. It should be forged at low temperature so as not to burn the steel, and then tempered hard as possible in a solution of salt in water that has been boiled. When drilling the glass do not bear too hard on the drill and keep the point well moistened with turpentine in which gum camphor has been dissolved. As soon as the drill becomes somewhat dull it must be sharpened on the grindstone.

Another method is to make a spear-pointed drill the size of a hole required, heat the drill to white heat without burning it, then plunge the point into mercury (quicksilver), which will make it very hard, sharpen the cutting edges on an oil stone and put the drill on a file or a bradawl, as a drill-stock will be useless, as the motion must not be all one way, but similar to that of a bradawl through wood. Dip the point of the drill frequently into a saturated solution of gum camphor in turpentine. (By a saturated solution we mean as much camphor as the spirits of turpentine will dissolve).

—1576—

Obscuring Glass to Produce Frosted or Ground Glass Effect.

The glass to be frosted or obscured must be laid flat on a suitable table, the side to be operated on thoroughly cleaned and finally gone over with a cloth or sponge, made moist with alcohol in order to remove all grease, then wiped with tissue paper. Around the edge of the pane or sheet of glass put a border, about one-quarter inch thick, of beeswax, pressing the softened wax down firmly. Have the glass laid perfectly horizontal, so that the obscuring acid will be at an even depth on the glass. The white or obscuring acid is a mixture of one-third fluoric acid and two-thirds liquid ammonia, and must be kept in leaden or gutta percha bottles. Pour this acid over the glass so that it will be at least one-sixteenth of an inch in depth at every point; let it act on the glass until it has roughened the clear surface, then pour off the acid in a shallow leaden pan and rinse the plate with clear water. If not obscured enough, return the acid again to the plate and add a little more fresh acid. When acted upon sufficiently, remove acid, returning same to bottle for future use, rinse plate, remove the wax border and set the plate on edge to dry. There are various other methods to imitate the frosting of glass. One of these consists in taking white sugar of lead ground fine in linseed oil, thinning this to rather stout brushing consistency and applying the same with a flat brush to the glass in uniform thickness. When the coating is nearly ready to set it is stippled with a brush of proper size, or it may be pounced with a wad of cotton in a bag of muslin or linen. This frosting, unless exposed to direct sunlight or subjected to hard scrubbing, often repeated, will stand for many years, and even where exposed to the direct sun's rays and washed frequently, the writer has known it to stand for four or five years.

—1577—

Putty for Glazing in a Conservatory.

We would caution you against the use of commercial glazing putty, and no matter how high the cost may be, advise you to use only strictly pure putty that is guaranteed to be made from whiting (chalk) and pure linseed oil, with not less than 10 per cent. pure white lead (basic lead carbonate) well seasoned (sweated). Common putty used in conservatories, where there is heat and moisture inside and usually strong exposure to the sun and weather conditions outside, will not stand for any length of time, but bulge out or crumble, causing leaks. Specify the above and pay a reasonable price for the article and you will take no risks.

—1578—

Proper Method of Laying a Glass Roof.

The glass roof or skylights, that consist of extra heavy glass laid in galvanized iron or steel frames and of which many are sent from here to the West Indies and South America, where they are subject to extreme heat and again to long-continued rainy weather, are not laid in ordinary glazier's putty, but in paste oil paint, and the very best material for this purpose is paint skins, in paste form, that have been run through a paint mill or a putty chaser, or, still better, that have been boiled over a fire in a kettle and softened somewhat by adding linseed oil. This remains elastic and does not crack; on the contrary, has the characteristics of rubber, when made from linseed oil paint skins. However, if you simply lap the glass without frames, as in the case in skylights, if you simply lap the glass without frames, as in the case in skylights, the end of each under glass, and finally, when laid and paint has set, the ridge made by the top layers must be touched up with the same material in manner similar to that used when clapboard sides are painted, excepting that the paint must be much stouter.

—1579—

Methods for Frosting Window Glass.

There is a very simple way of frosting window glass or mirrors by making a saturated solution of epsom salts in warm beer or ale; that is, put as much of the salt in the warm liquid as will dissolve. When, finally, a slight white sediment forms in the bottom of the glass vessel, the solution will contain all the salt it is able to take up. It is then applied to the glass, that has been well cleaned, with a soft brush or sponge. If done in a cool place, the evaporation is slow and the effect of crystallization much prettier, than otherwise. If the glass can be laid horizontally, it is all the better. In order to make the frosting last, it may, when dry, be coated with a transparent spirit varnish, or with a solution of white wax in turpentine, which latter will make it moisture proof. If it is desired to make the glass opaque in a frosted effect, fine whiting ground in two parts raw linseed oil and one part pale japan, thinned with turpentine to stout brushing consistency, applied with a soft flat brush and stippled will produce the desired effect.

—1580—

Green Putty or Cement for All-Glass Show Cases.

There are various formulas for preparing this, the simplest being by dissolving one part of pure casein in six parts of sodium silicate (water glass) of 33 degrees Be. and coloring with lime-proof green. Another formula is to mix four parts by weight of quicklime with six parts by weight of litharge, both in fine powder, with one part by weight of best linseed oil varnish (strong boiled linseed oil, such as is used by varnish makers), to be colored with lime-proof green in dry powder. Still another formula for glass cement is to mix five parts by weight of pumice flour with one part by weight of Venice turpentine or Canada balsam and two parts by weight of bleached shellac varnish. This may be colored with green aniline dissolved in a little alcohol.

—1581—

Making Silk Stick to Glass.

You cannot make silk or other fabrics adhere to glass, unless the glass has been ground on the side where the silk is to be applied. This can be done by rubbing over the surface with some fine pumice or sand and water. Lump pumice and water will also be sufficient to dull the glass enough to make the paste adhere. For the preparation of the sticking solution, use isinglass (purest gelatine), dissolved in boiling water in a very clean receptacle and strain through filter paper when cool. The surface of the glass should be cleaned with a cloth

moistened with alcohol and allowed to dry before the gelatine solution is applied. The gelatine can be rendered waterproof by adding to the hot solution a hot solution of bichromate of potash, but the latter is liable to stain the silk.

—1582—

Coating Ribbed Glass to Take Off Glare.

Wanted to know the best solution to put on ordinary ribbed storm glass in the form of paint to take away the glare of the sunlight; something that can be removed easily, as it is intended for a temporary expedient only, preparatory to placing art glass inside of it at some future time.

White sugar of lead ground fine in oil and thinned down with a trifle of pale japan drier and turpentine to the consistency of stout paint, which is brushed over the glass, and when about to set up the coating is pounded all over uniformly with a ball of cotton waste, encased in some coarse muslin, to give the appearance of frosted glass. This coating can be removed, when desired, by the use of strong ammonia or soda solution. The sugar of lead solution will not obscure the light, but will do away with the glare of the sun on the inside of the glass. If sugar of lead ground in oil cannot be procured readily, mix fine whiting to a paste with equal parts of linseed oil and japan drier, thinning the resulting paste with turpentine, using it in the same manner as indicated for the sugar of lead coating. When either of these coatings have become very hard by long exposure, one of the quick paint and varnish removers will resolve them within fifteen minutes, while ammonia or soda solution act much more slowly.

—1583—

Fixing Bronze Powders Permanently to Glass.

The best process we know of is to have the glass thoroughly clean, using alcohol for the purpose, if necessary, then giving the surface to be decorated a thin and uniform coating of silicate of potash solution, concentrated to 30 degrees Be. Immediately cover the still wet solution with bronze, plain or colored, by means of a fine sieve. Allow this to dry by ordinary heat, say, at about 75 degrees F., and when perfectly dry remove with a broad camel hair brush the excess of bronze that has not been taken up and fixed by the potash water glass. The latter effects such an intimate combination and adhesion of the layer of bronze powder to the object, that even alcohol, ether or water are incapable of removing the same. With some care the article may be polished with a burnisher or agate, giving it the appearance of having been fired.

—1584—

Applying Transparent Oil Colors to Glass.

The best way to apply oil colors to glass, so that the painting will not bleed out and give the best effect.

Use ground glass and rub over the ground side with some waste or cotton, dipped into a mixture of equal parts linseed oil and turpentine, then dip some cotton in turpentine or benzine, and so remove the oil and turpentine, going over it with a dry cloth, free of lint and let the glass dry well. Now dust some fine starch on the ground surface, removing it with the painters' duster. This removes the dust produced by the grinding of the glass entirely and there will be no bleeding out of the colors.

Do not draw your sketch with lead pencil, as that always shows on the reverse, but use black crayon or pounce with charcoal, as these will be taken up by the oil colors. Select finely ground colors only, preferably tube colors, and make them flow freely by adding a little varnish, and thinning with turpentine.

This method of thinning is suggested for first and second coats, while for large paintings the last or finishing coat should have more varnish and less turpentine. It is best to stipple each coat. Should the finishing coat dry out flat in places, go over it, when thoroughly dry, with a coat of good pale coach varnish.

SILVERING MIRRORS.

—1585—

PROCESS FOR SILVERING AND RESILVERING MIRRORS.

*By George H. Gresser, Canton, Ohio.**

The following equipment is suitable for paint shops:—

- 4 two-gallon clear glass bottles, with ground glass corks and ground necks on bottles. Two bottles marked No. 1 and 2 bottles marked No. 2.
- 1 one-quart glass graduate, 32 oz.
- 1 eight or ten-inch glass pestle.
- 1 piece round glass $\frac{1}{4}$ -inch thick, 8 or 10 inches long.
- 1 one-pound box absorbent cotton, best.
- 2 one-gallon or three-quart glass funnels to fit neck of two-gallon bottles.
- 1 one-gallon bottle for shellac.
- 1 one-gallon jug for nitric acid.
- 1 one-gallon bottle or jug for alcohol.
- 1 one-gallon can for paint remover.
- 1 one-gallon can for color varnish.
- 1 two-quart or three-quart glass (or china) pitcher.
- 1 one-quart bottle for strong ammonia, glass cork.
- 25 hard wooden wedges, one-inch by one-inch by eight inches, tapered to one-quarter-inch by one-inch on one end.
- 1 two-foot level.
- Ten cents worth of old newspapers, "clean."
- 1 wooden box with cover for powdered chalk.
- 1 one-quart enameled ware cup with long handle.
- 1 one-ounce apothecary's scales.
- 1 five-gallon jug for distilled water or rain water.
- 1 one-pound bottle of nitrate of silver, C. P. (Keep in dark place).
- 1 pound Rochelle salts (Sod. Pot. Tar.). Keep airtight in large neck bottle.

Materials for solutions No. 1, two gallons:—

Weigh out on your scales or have your druggist weigh out and mark contents on packages:—

No. 1—560 grains of nitrate of silver (marked).

520 grains of nitrate of silver (marked).

For solution No. 2:—

No. 2—394 grains of nitrate of silver (marked).

394 grains of Rochelle salts (marked).

Mixing Solution No. 1.

Two gallons:—

Pour into graduate 6 or 8 ounces of distilled or rain water, dissolve in it 560 grains of nitrate of silver by pounding or grinding with glass pestle (which must fit bottom of graduate or mortar), add strong ammonia (26 degrees) until solution turns coffee color and while stirring with pestle. Keep on adding ammonia and it will become clear again. Then add 520 grains of nitrate of silver and dissolve with pestle and solution will turn coffee color again. If your solution does not color, clear, and color, your ammonia is weak. Fill balance of graduate with distilled water until you have 1 quart (32 ounces) and filter into your two-gallon bottle marked No. 1. Wet your glass funnel with water; tear off a small handful of cotton and tear apart so as to not be too tight; force cot-

*Written specially for this book, giving modern commercial processes.

ton into neck of funnel with glass one-quarter by eight inches or lead pencil. Pour into funnel contents of graduate and measure out seven more quarts of distilled water and keep a record of it until you have eight quarts of solution filtered through the funnel. See that your bottle is clean and that your solution is clear on first filtering. Filter this solution three times in all, with clean bottles, clean cotton and clean funnel. This solution must be perfectly clear; solution must not come through cotton more than several drops at once, say one hour for filtering two gallons once. Cork up with ground edge glass corks until ready to use.

Mixing Solution No. 2.

Pour into graduate 5 or 6 ounces of distilled or rain water and dissolve 394 grains of nitrate of silver. Pour the water and silver into your one-quart enameled ware cup and add 394 grains of Rochelle salts (Sod. Pot. Tar.). Place over fire or gas stove and boil strong for five or six minutes; let cool. Pour back into graduate and fill to 32 ounces with distilled water, then filter same as in solution No. 1 into bottle No. 2, filtering three times and using the same care not to filter too fast or into dirty bottles, cotton, or funnels. Filter from bottle No. 2 to bottle No. 2 after you have run eight quarts through funnel on first filtering. Cork up tight until you are ready to use. You can use these solutions immediately after being made or at any time providing you refilter just before you use them. New solutions can stand for about one week without the necessity of refiltering. The idea of refiltering is to get the silver evenly distributed in the water and to remove all impurities from the solution. For a small number of square feet of silvering, filter what you need. It is not necessary to filter the entire contents of bottles.

You now have 4 gallons of solution, or enough to silver 40 square feet of glass, using 3 ounces of solution No. 1 and 3 ounces of solution No. 2 to each square foot to be silvered, at a cost of about five cents per square foot for silver.

Silvering (New Glass).

Have a fairly level table, or place planks or boards on trestles. Lay glass on four wooden blocks or wedges, one-inch by one-inch by eight inches, tapered to one-quarter inch by one-inch on one end; two wedges on each long side of glass, silvering side up. Clean glass with commercial nitric acid, cut one-half with water; use a swab. After you have cut all grease, etc., from glass, rinse with clear water, using old newspapers, one-half of one sheet folded in such a manner as to cover as large a surface as possible, rinse two or three times, using new paper every time, always rubbing to outer edge of glass. See that all acid is removed from edge and surface of glass, which must be perfectly clean. Run your finger over glass near edge and place lightly on tongue. If it tastes salty you must rinse and clean again (turn your hose on glass, if convenient). After glass, edges of glass, wedges and table are perfectly clean, sprinkle glass with powdered chalk and a small quantity of clear water and polish with paper. After chalk is dry, level up your glass with level which must be clean on bottom. Brush off all chalk and polish your glass with clean paper. You may use a wind bellows to blow any particles of chalk from table, wedges and glass, or you can dampen your paper (new) with water to gather up all loose chalk. Look out for dust, dandruff, flies, wind or finger marks. Do your final cleaning or polishing immediately before silvering so as to have your glass perfectly clean. Now you are ready to silver.

Silvering.

Pour into graduate 3 ounces of silver solution for every square foot of glass to be silvered from bottle No. 1. Pour this into your pitcher. Pour into empty graduate 3 ounces of silver solution from bottle No. 2 for every square foot of glass to be silvered. Pour into pitcher and pour from pitcher all over glass in as rapid a manner as possible. Get glass covered all over and if solution does

not run to outer edge of glass force it there with your long piece of glass, one-quarter-inch by eight inches (or use a lead pencil). Leave solution on glass one-half hour to one hour, or until all silver has dropped to glass. If glass does not silver in a few places, you can force it with heat on under side of glass. If any particles of dirt, heavier than water, drop on glass, remove with cotton lightly. But this will not be necessary if you have followed instructions. See that your glass, solution and room are about the same temperature, 50 to 100 degrees F. will do. Some mirror factories, or where silvering is done in large quantities, use a marble or stone slab with gas or steam heat underneath to force silvering.

After glass has been silvered, pour off all water and stand glass on edge, on blocks, silvered side out, and rinse with clear water. Turn silvered side to wall. After one hour, or when silver is dry, back up silver with wood alcohol shellac, poured on or brushed on with camel's hair brush two or three inches wide. Shellac is made as follows:—One pint wood alcohol to one ounce of shellac. Let shellac dry on glass at least one hour. Back up shellac with a good grade of black color varnish; this last backing should be elastic and opaque. This backing should dry with an eggshell gloss. If you dust on pure aluminum bronze before varnish is dry or is tacky this backing will resist insects and dampness. Look out for scratches or rough handling of glass until backing is dry and hard. Clean face of glass with powdered chalk, paper and water.

Resilvering Old Mirrors.

Lay glass on table as in new glass. Dust off all dust. Remove backing with paint remover and rag, one-half benzol and one-half denatured alcohol, or lye, lime and flour remover. After you come down to shellac and your removers do not cut it use denatured alcohol. After you have shellac removed, and all grease, take off silver with nitric acid, commercial, about one-half acid and one-half water or stronger. Use a swab. After silver is removed rinse with water and new papers until you have glass perfectly clean. Watch your edges and blocks and under side of glass so as to remove all acid. Follow same instructions from now on as in silvering new glass. If you come to a place where old silver has tarnished or corroded and has rusted glass, you will have to grind it off with a cork and powdered chalk. But under no circumstances use a knife or any hard object to remove backing or silver from the glass as every scratch shows up when resilvered. Proceed to silver as in silvering new glass. After you have succeeded in doing the above properly you should receive fifty cents a square foot for resilvering and forty cents for new glass silvered, except in cities where there is a mirror factory (without delivery) for your services. All material cost you about five cents a square foot without equipment.

Don't try to resilver part of an old mirror. Remove all old silver and resilver the whole glass for a first-class job.

Don't attempt to make perfect mirrors out of a piece of common window glass. "Ask the glass manufacturer."

Don't get discouraged if you must silver a mirror two or three times to get it right.

Keep all your equipment in a dark cupboard.

Don't try to silver your first glass at night.

Look out for rusty spots and call your customer's attention to all scratches, or imperfections in an old mirror before you resilver.

Everything used in silver mirrors must be clean.

Your hands must be clean at all times while doing this work.

Don't get solution No. 1 in bottle No. 2, or you will have a silvered bottle and you will be out of pocket.

Always stand your graduate, funnels and pitcher upside down on a clean newspaper when not in use.

Don't try any new formulas until you have learned this one.

Don't try to get a first-class mirror out of a piece of salvage or old glass, silvering quality only will do.

Be very careful that you don't scratch a perfect piece of glass yourself in cleaning or polishing.

Don't order a piece of ordinary polished plate glass when you want to make a new mirror. Order selected silvering quality, free from imperfections.

If your solution runs off edge of glass, caused by a rough edge or small chips broken off edge of glass, stop it with a piece of paraffine wax rubbed on edge.

Convex, curved, concave or chipped glass can be silvered by this process, but requires more solution to the square foot, and all dams must be made from or covered with wax or paraffine.

For mirror background signs, back up your silver with asphaltum, and when dry remove unprotected silver with dilute nitric acid. Don't get any oil paint next to silver.

If you want an extra fine mirror, you can follow up with a second silvering, immediately after you pour off water and rinse, but before silver is dry.

—1586—

Making a Mirror with Common Window Glass.

You cannot make a mirror with common window glass. It will be far from perfect, and it is a waste of time and money to make the attempt. Even ordinary plate glass will not do; it must be selected silvering quality, free from imperfections.

We will here give a simple, yet effective method for silvering perfect glass:— Dissolve one and one-half ounces of Rochelle salts in three ounces of water and filter the solution, then make a second solution of one and three-quarter ounces of silver nitrate dissolved in four ounces of water, and this should be added cautiously to one ounce of liquid ammonia while a brown precipitate remains; then add fresh ammonia and again alternate silver solution and ammonia until the whole of the silver solution has been used and the mixture has still some of the brown oxide in suspension. The solution must be filtered, and when wanted for use both it and the Rochelle salts solution are mixed together and twelve ounces of clear water added. This solution is placed in a shallow pan of a size larger than the plate glass to be silvered, the plate glass cleaned thoroughly, first with alcohol and wiped dry, then with tissue paper and laid face downward in the solution, and in thirty minutes the glass will be silvered. Of course, the solution must only touch one side of the glass. Everything used in the process must be perfectly clean.

—1587—

Removing Silver and Resilvering Old Mirrors.

To remove silvering from an old mirror that was properly done originally is somewhat difficult and requires some practice and a good deal of patience. When backed by flat black or red paint, any paint remover of merit will take that coat off; but for the silvering, a solution of one part by weight of nitric acid and six parts sulphuric acid in ten parts by weight of water may be required to resolve the silver, and the operator must protect his hands with rubber gloves and be very careful to get none of the solution on his clothes. A swab of cotton on a stick is used to apply the solution, and as soon as the silvering is lifted the glass is rinsed with clear water and then cleaned with a cloth dampened with alcohol and allowed to dry.

Whether a scratch in a mirror plate can be removed by polishing depends upon the depth of the scratch and whether the plate is worth the expense of repolishing.

The best backing for high-priced plate-glass mirrors is said to be quicksilver vermilion (English vermilion) mixed with rubbing varnish to a smooth paste and thinned with turps for spreading evenly with the brush, but the usual practice is to apply one or two coats of flat black, mixed by thinning drop black with turpentine.

—1588—

Repairing and Resilvering Mirrors.

Recipes were tried for silvering by smoothing out tinfoil and then applying quicksilver, which works well and gives the mirror effect, but it does not adhere to the glass, even after having been weighted down for a day or two.

Did you have the spot, where you laid on the quicksilver, thoroughly clean? The recipe requires it. Are you certain that the cleaned spot on the glass did not sweat before you put on the quicksilver? The least trace of grease will prevent adhesion, and the tinfoil must be of the best and purest kind and very clean. Here are a few precautions for beginners recommended to us by an expert in silvering:—

Do not try to resilver part of an old mirror. For a first-class job remove all old silver and resilver the whole glass.

Do not expect to make perfect mirrors out of window glass.

Do not get discouraged if you must silver a mirror two or three times in order to get right results.

Do not try to silver your first glass at night.

Be sure your hands and everything else in use are absolutely clean while doing this kind of work.

Master one formula before attempting another.

Do not put solution No. 1 into bottle used for No. 2 or you will have a silvered bottle, and consequently at so much loss.

—1589—

Cold Method of Backing Mirrors.

Amalgams for backing up mirrors are made in many different ways. Adding mercury to a metallic salt or adding metal to a mercury salt is the most ordinary way. The amalgam is required in a fluid state, but its use is detrimental to the health of the operator. A method described by A. A. Common, of London, England, strikes us as the most simple, and is as follows:—For a surface of 250 square inches make three solutions:—

A. Nitrate of silver 1 ounce, distilled water 10 ounces.

B. Caustic potash 1 ounce, distilled water 10 ounces.

C. Glucose one-half ounce, distilled water 10 ounces.

Add ammonia to solution A drop by drop until the turbidity formed on mixing is just cleared. Now add seven-eighths of solution B to A, and again ammonia, drop by drop, until the mixture is clear, then add drop by drop, enough of the remaining solution B until the mixture of A and B becomes quite turbid again. Finally add solution C and apply the resulting solution to the perfectly clean and clear glass by flowing, or with a wide soft brush, and allow to dry. The film should dry in 45 minutes.

BRUSHES.

—1590—

Good Work Impossible with Wrong Brushes.

Perhaps the lack of skilled mechanics is one reason why the railroads use the wrong kind of brushes to paint bridges. The four-inch flat brushes that are generally used for this kind of work are made for unskilled mechanics who want something easier to use than the six-naught brush. There's no use talking, you can't spread out paint in a thin layer and brush it thoroughly onto the surface except with an elastic round brush. It is the same thing in painting a metal roof. You can't do satisfactory work with a long handled brush. You may save your back, but you do it at the expense of the roof. In painting either tin roofs or iron work, the main object should be to get a thin layer of paint spread on the surface of the metal.

The Veteran Painter

—1591—

Brush Bridling.

A twine-bound brush is most acceptable to the generality of painters. They claim there is more spring to it than to an iron-bound brush or than to any of the patent binders that have been put on the market. The trouble with a rubber-bound brush is that the moment you put it into turpentine, you soften the bridle and start to rot it. I never saw a brush bridle that will take the place of the old twine binder. But it needs a practical man to bind a brush. A good many men do not know how to allow for the shrinkage of the twine when it is wet, and as soon as the brush is put into water the twine binder will shrink so much that the bristles will spread out like a fan. Sometimes the inner bristles will be forced out between the outer layers and the brush will be ruined. You can never do anything with it, even if you take the bridle off and bind it again.

The Veteran Painter.

—1592—

Solid vs. Hollow Brushes.

The experiment has been tried of making a solid brush without a cavity in the center, but when you come to load it with paint there would be no spring to it, and it would work flabby. It won't begin to compare with the hollow brush that painters have used for the past hundred years or so.

The Veteran Painter.

—1593—

Round vs. Flat Brushes.

The only brush is the old six-naught—the pound brush. A good many painters are using a four-inch wall or flat brush for painting weatherboards, but it is all wrong. You can't spread the paint on so well or rub it out so well as you can with the pound brush. The four-inch brush hasn't the spring that the pound brush possesses. For plain painting, inside as well as outside, there's nothing just as good as the old six-naught brush. For trimming use the five-naught brush, and for cutting in a sash a fitch in place of the round sash tool. One reason for preferring a fitch is you can get right into the corners with it. There's one thing about a pound brush, and that is you cannot do good work

with it inside a house until it has been broken in. A brush can be used for outside work until it wears down to the proper shape for use, but it often happens that there is a good deal of inside work to do, and than the painter is hard put to it for brushes to work inside with. I have often tried to get brush manufacturers to make six-naught brushes that are properly beveled or chiseled, the same as a brush which is broken in, but somehow they never seem to be able to do it. It would be worth a good deal to a painter to be able to buy such brushes, but he can't get them. I have even gone to the trouble to take a brush that had been used until it was properly broken in and have cleaned it and sent it to the brush manufacturer as a guide, but somehow they always seemed to get the brushes beveled off too much or too little, and finally they gave up trying. When he have a lot of inside work to be done, we sometimes have to take brushes away from men who have been working outside and give them to painters who are going to do the inside work. No man likes to have a brush taken away from him after he has got it nicely broken in to suit himself. I can't understand why they cannot make satisfactory chiseled round brushes, for varnish brushes are always made chiseled.

The Veteran Painter.

—1594—

Cleaning Brushes That Are to Be Put Away.

You cannot get a brush clean with naphtha, especially if it has been used in color containing turpentine. The turpentine will liver up and form a mass that you cannot get rid of. My plan is to use soap powder, or else to use any good kitchen or laundry soap that will make a good lather, and work the lather into the brush the same as you would do in a shaving brush. Then put the brush away with the lather in it. When you want to use the brush again, all you have to do is to wash the soap out in water and you will find it in fine condition. The alkali of the soap has neutralized the paint, but it has not been strong enough to burn or harm the bristles in any way. You could put a brush away for five years if you wanted, and would find it all right when you wanted to use it again. You could do the same thing with varnish brushes if you will take the trouble to bind them lightly so that they will keep their shape.

The Veteran Painter.

—1595—

To Put Brushes Away.

If you are going to lay a brush away for four or five days it ought to be suspended. If it stands on its end in the tub the bristles are apt to turn over on the end and the brush will lose its shape. If there should be no hole in the handle, you should bore a little hole through and fasten a piece of wire in so that you can hook the brush over the edge of the tub and the bristles will not rest on the bottom. It doesn't cost much, and it preserves the brush. In fact, the brushes we buy all come with a small hole bored through the handle. Most painters put their brushes away in a tub of water to keep the brushes soft, and so that they may be cleaned readily when they want to use them again. It would be preferable to keep the brushes suspended in oil, but the trouble is that oil is expensive and unless it is somebody's business to see that it is used up it is apt to get fatty and no good. Besides that, the oil in the brush tub is sure to get discolored and can be used only for dark colored paint. One man may have been using white and another green and perhaps still another one will have blue or red in his brush, and the mixture of all these colors in the oil will make it unfit for using with tints where any care in the coloring has to be exercised. A very good plan is to fill the tub with water so that the water will cover the brushes about two-thirds of the length of the bristles, and then pour linseed oil on top of the water. The oil will come up on the binding and will prevent the water from swelling and bursting the brush. Varnish brushes should be kept in varnish.

The Veteran Painter.

—1596—

Washing Out Stippling and Other Brushes.

What is the best way to wash out stippling brushes? After using I always use a rag saturated with turps. When a brush has become gummy through neglect, what will take that gum out?

Turpentine for washing out brushes is rather expensive these days, and there is no reason why benzine or gasoline should not be used for the purpose. This applies to stippling brushes as well as to other paint brushes. Liquid paint and varnish remover is the very best thing to take gum from a brush, as it does not injure the bristles if the remover is free from caustic and alkalies.

—1597—

Washing Brushes in Kerosene.

While I would not recommend kerosene as the best brush cleaner, still it does not do a great deal of harm. After a brush is washed out, if you take it between the hands and give it a flirt you can throw almost all of the kerosene out of it, and what little is left will be so little that it will dry out completely. If you have ever noticed a lamp wick that has been burned out and has been left out in the sun you will see that it is perfectly dry and is not oily at all, and it would be the same with a brush. The advantage kerosene has is that it is an excellent solvent for almost everything, and it is cheap and can be obtained everywhere.

The Veteran Painter.

—1598—

Washing Brushes in Benzine or Naphtha.

If you wash brushes that have been in ordinary oil color in benzine or naphtha, there will be a sediment left in the bottom of the can that cannot be dissolved by any alkali I know of. And if by accident you dip your brush into this sediment, you cannot clean it out of the brush.

The Veteran Painter.

—1599—

Cleaning Paint Brushes That Have Become Hard.

Soak the hardened brushes for twenty-four hours in raw linseed oil, then place them in a pot of benzine, and after a while work the bristles with the hand until you get them separated, when the paint will finally soften so that it will wash out. For small pencils or the more expensive hair brushes, chloroform is the most rapid softener and cleanser, and when the brushes are well cleaned and dried, grease the bristles with a mixture of sweet oil and tallow and place them in a close box to exclude air and dust. Ordinary or fiber brushes, that have become hard in paint may be soaked in soda water, and when soft, washed out with soap and water and rinsed with clear water. To keep them in good condition, steep them in clear water, when not in use.

—1600—

Varnish Brushes for Car Finishing.

The flat and the oval varnish brush each has its friends among passenger car finishers, but just why there should be such a wide diversity of opinion in respect to the merits of the two styles of brushes is not very easy to comprehend. The flat brush of medium size is an especially handy tool in finishing car exteriors, for wiping out corners and slicking up the flow of varnish, but for flowing the surface the oval brush is in all points superior. It carries a much greater quantity of varnish, has a larger measure of elasticity immediately under control of the workman, and, what is perhaps of more consequence, more surface may be coated up with it than with the flat brush.

—1601—

Stippling Brushes for Walls and for Graining.

An old subscriber of Eldora, Ia., says that stippling brushes are always oblong in shape and not round, like a duster, because they are required of a large enough size to enable one man to stipple the paint, which two men apply on an ordinary wall. The graining stipplers are made of long Russian bristles put in a flat handle like a wall brush, but very thin, almost like a fan, and it is used flatways, instead of endways as in wall stippling.

When we described stippling as we did in another section it was merely to convey the meaning of the term stippling and not so much intended to describe the tools used. A painter in the country, a long way from a brush supply house, has not always time to wait to order the necessary modern stippling brushes, and when a job of that kind comes to him very seldom, he does not care to keep a brush especially for that purpose, hence we gave him an idea how to trim a full round brush for the purpose.

—1602—

Brush Wiping Device.

Among certain devices which Foreman Painter Peebles, of the Erie's Hornell shops, has devised in the line of "betterments" is a concealed space for wiping out color and paint brushes, which is explained by the accompanying sketch, which shows a couple of rough boards with a one-half inch or three-quarter inch space between. These boards are fastened on a cleat on the back, which extends three or four inches on either side. This is screwed to the back of the box, and when the boards have become so smeared with paint that they are no longer available they may be removed and others placed instead. The box in which these panels are placed is about three feet six inches by four feet six inches, with a depth of four or five inches. At the bottom of the boards is a drip pan, and all is hidden by a door, and the visitor would never suspect what an unsightly mess was back of the door.

—1603—

Best Way to Clean a Stippling Brush.

Wash the brush in the usual way in benzine or gasoline, dipping it into the fluid bristles down, repeating this until the bristles appear clean, then take the end of the handle between the palm of both hands, twirling the brush rapidly so as to get out all the liquid possible. Do not wipe off the brush on the edge of the pot, as many do, as this method ruins the shape of the brush. After the brush has been cleaned in benzine or gasoline, dissolve a piece of washing soda the size of a walnut in a quart of warm (not hot) water, and repeat the operation, taking care to get a little water on the back and handle of brush. When the bristles appear thoroughly clean, wipe off the back and handle with a dry cloth, but do not touch the bristles, and set the brush in the sun or near the fire to dry. Wiping softens the bristles and so does the use of soap or soapsuds.

—1604—

Cleaning Kalsomining Brushes After Use.

Clear water, fairly warm, but not boiling hot, is the best means for cleaning brushes. Care must be taken that the washing is done thoroughly and then the brushes should be plunged again in tepid water and twirled between the palms of both hands. They should not be laid down but held in suspension while drying by being suspended on a piece of wire through the handle.

—1605—

The Care of Badger and Camel's Hair Brushes.

In the first place care should be taken in purchasing brushes for different kinds of work, and especially the setting should be noted. While for distemper and water colors brushes set in shellac or cement will answer, those intended for oil paints and varnish may be set in glue or cement, and these may also be used for shellac and spirit varnishes. Badger and camel's hair brushes are used only for the finest grade of work, and because of their high price should be especially cared for. As soon as they are out of use they should be washed in kerosene and twirled in the hands to shake out all the kerosene possible. Then wash them in soapsuds, followed by clear water, twirl again and allow to dry. Then suspend them in a brushkeeper, which contains raw linseed oil or kerosene. Camel's hair pencils are washed out in turpentine and then in soapsuds, or if the latter is not done cover the hairs with a mixture of fat or tallow and linseed oil and put them away in a suitable dust-free box. Should camel's hair brushes or pencils by any chance have become hard, use chloroform or a paint and varnish remover, that is free from alkali, and when the brush or pencil is well cleaned grease the bristles with a mixture of sweet oil and tallow.

—1606—

Softening and Cleaning Hard Paint Brushes.

If the brushes are good bristle brushes, soak them in raw linseed oil for a day or two, then place them into a pot of benzine, and after a time work the bristles with the hand until you get them separated, when the paint will soften so that it will wash out.

A mixture of three parts solvent naphtha or benzol and two parts of wood alcohol will soften bristle brushes very quickly when steeped in the mixture for a short time, but this is rather expensive. Ordinary seagrass or fiber brushes that have become hard from paint may be soaked in strong soda water until softened, then washed out with soap and water and rinsed clean in clear water. To keep them in good condition keep them in clear water when not in use, but bristle brushes are best kept in raw oil.

—1607—

Brushes or Pencils for Lining in Oil or Water Colors.

Wanted to know what brushes or pencils are best for fine lines in striping in either oil or fresco color. The questioner used a black sable pencil for lining in distemper, but found that the paint dried before the lines were completed.

It makes no difference as to the style of pencil used in either oil or water color, and your trouble in not finishing the line is due to your distemper color being too short and not to the pencil used. Add a little glycerine or ox gall to your water color for striping and you will have no trouble whatever, but do not overdo it. Use a camel's hair pencil of sufficient length.

—1608—

Keeping Shellac Brushes Soft When Not in Use.

There is no other way than either to keep them suspended in alcohol, either denatured or wood spirit, by having a wire through the handle so that the spirit does not come into contact with the setting of the bristles, or to wash out the brushes with alcohol every time they have been used and keep the bristles dry. Brushes that have been used in paint or varnish and have become hard can be softened by keeping them in creosote oil for about two days, and then wash them with benzine or gasoline.

TOOLS AND APPLIANCES.

—1609—

Preserving New Ropes from the Weather.

The best preparation to put on new ropes that are to be used in blocks and falls in order to preserve them from the weather was wanted.

Make a solution of sulphate of copper (blue vitriol) in water, one pound of the crystals to four gallons of water and soak the ropes in this solution for four days, then dry them. By this means the ropes are impregnated with the copper sulphate, which keeps them from being attacked by animal parasites and from rot. The copper salt may be fixed in the fiber by a coat of tar or a soap solution. In your case the latter is preferable. To make this solution slice fine some ordinary yellow bar soap and dissolve it in boiling water, one pound of soap to one gallon of water. While still lukewarm place the rope in the solution and let it soak over night, then take it out and let it dry. The copper soap so formed is more effective even than the tar.

—1610—

Care of Ropes and Ladders.

Ropes ought to be kept in a dry place. They should not be stored on the first floor unless there is a cellar underneath, because they are very sensitive to moisture. A great many painters leave their ropes hanging to a building, sometimes for several days. If a storm comes up, the ropes get soaked through. The men should always be required to take the blocks and falls down, and stow them away where they won't get wet, even if it is a forty-story building. The outside of the rope may get dry, but the fibers in the inside are apt to keep wet and rot, and before you know it you have a serious accident.

Tarred ropes are all right on shipboard, but if a tarred rope swings against the side of a newly painted house it will discolor the building in a way that is very difficult to remedy. There's another thing a good many painters don't think of. They will buy a block and fall and use it continually, just as it is, until the rope wear out. Now, if they would occasionally pull all the rope out and run it in again, the other end to, so that the strain comes in the opposite direction and the wear on different parts of the rope, they would find that their tackle would last a great deal longer.

Ladders ought always to be stored and kept under cover. They ought to be overhauled at the end of each season, and thoroughly painted, instead of being left to depend on the paint that happens to drip on them. And they should be thoroughly tested by being laid flat and having a heavy man walk up and down them, bearing his full weight on each round. It is a good deal better to have a round break then than when a man steps on it, thirty or forty feet above the ground.

The Veteran Painter.

—1611—

Care of Ropes.

Mr. Roemis said he did not think ropes ought to be kept in a box. They need air to preserve them, and should be hung in a dry place where moisture absorbed from rain, etc., will dry out.

Mr. Miller said ropes should be hung in a dry place with a lot of ventilation. He had known ropes hung in a cellar to be rotted—whether it was a wet or dry cellar. Ropes kept in a cellar shop were bright and clean, but had broken in use, while dark and rusty looking ropes might stand the test.

Ohio Convention, 1905.

—1612—

The Way to Raise a Ladder.

Mr. Engel said a ladder that is raised or lowered on the edge will get out of shape, weak and shakey. A ladder should always be raised flat.

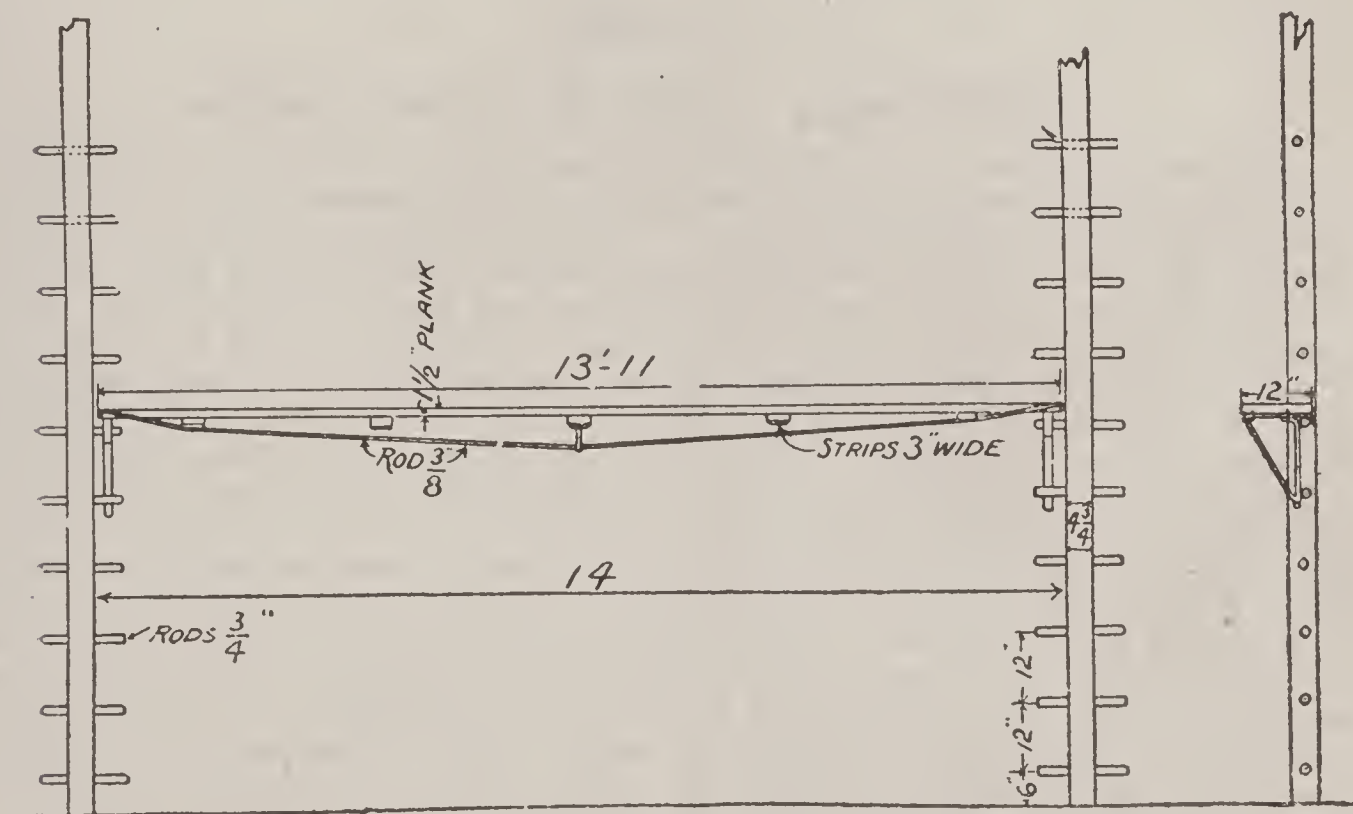
M. W. Master Painters' Convention, 1907.

—1613—

A Simple and Inexpensive Scaffolding Device.

The sketch shows a scaffolding system installed in the passenger car paint shop at Buffalo of the Erie Railroad. Master Painter W. J. Orr, of the above shop, finds this style of scaffold very satisfactory. Its chief features are simplicity, lightness, strength, security against accident, and nominal cost as compared with numerous other systems.

The sketch is self explanatory, being drawn to a working scale with all necessary measurements given in detail.



A simple and Inexpensive Scaffolding.

—1614—

To Hang Hooks for Swing Stage on Steep Slate Roof.

A painter wants to know how to hang hooks for a swing stage on a steep slate roof.

We would not advise the use of hooks to swing scaffold from steep slate roof, owing to the fact that the weight of the scaffold would come almost entirely on the gutter, which is usually dependent on very light brackets for support. If, however, it is found that the gutter is strong enough an "S" hook can be used. These hooks are made especially for this purpose, and can be purchased from the regular dealers in scaffolding, etc. A more reliable method of adjusting a scaffold to a steep roof would be to use strong ropes anchored to chimneys or to beams of wood adjusted to upper windows or rear of house. After being properly tied to

these beams the ropes can be slung over the entire roof from rear to front and propped out over the cornice with planking to prevent the ropes from indenting the cornice (if metal). The blocks and falls can then be adjusted and the scaffold hung.

—1615—

Sand Blast Machines.

One of the most effective sand blast machines for removing paint, scale and rust from locomotive tanks, or from metal surfaces of any sort, that we have seen is operated at the Sayre, Pa., shops of the Lehigh Valley Railroad. It is fashioned after the sanding machine described in the preceding section, and is an exceedingly simple device, easily operated, and throws a very powerful current of sand. The sand reservoir holds only a small pail of sand and is attached to a long tube which, in turn, may be attached to the compressed air apparatus, and the entire equipment may be easily carried and handled anywhere about the work. The simple mechanism and the unusual lightness of the device, and the ease with which it is handled, give it an advantage worthy of note.

—1616—

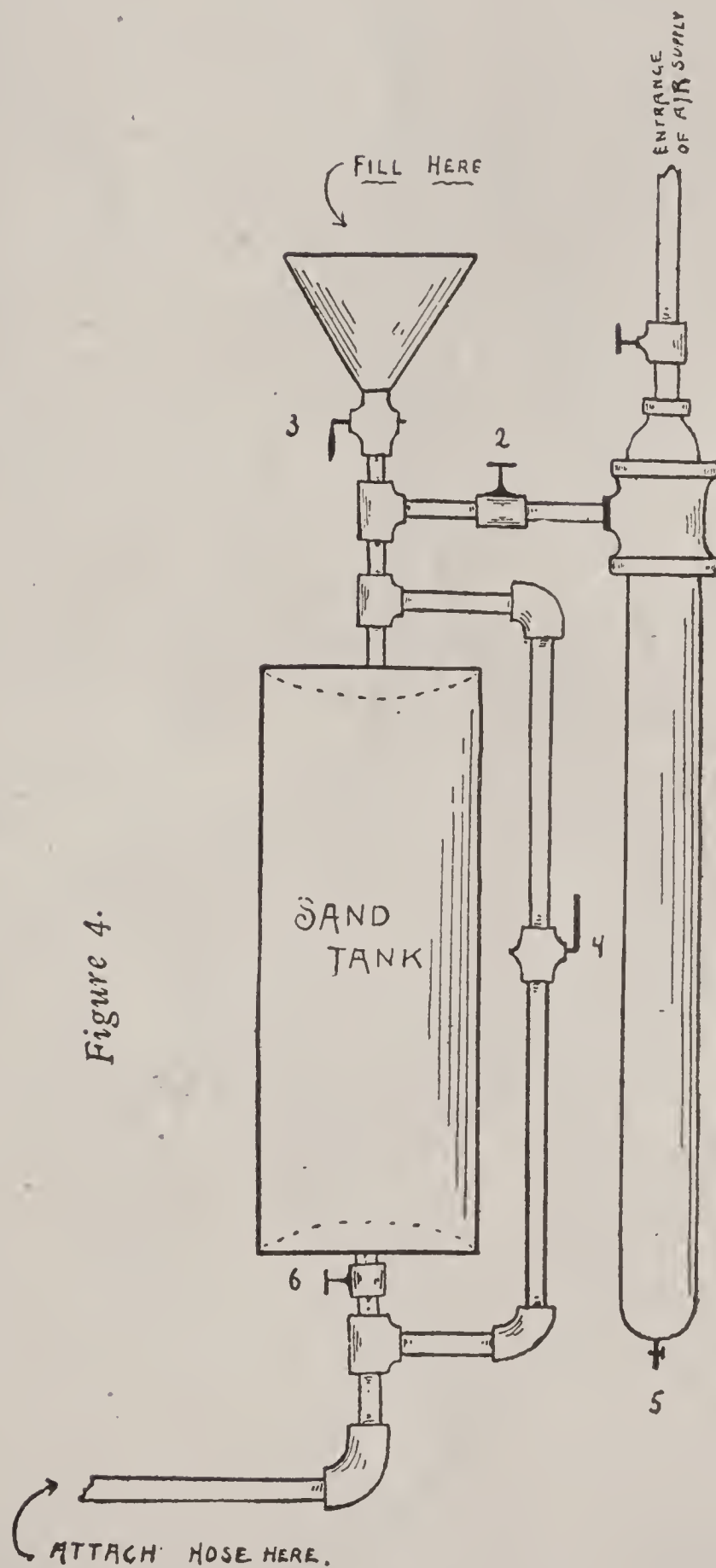
Sand Blasting and the Sand Blast Machine.

In painting steel car equipment the sand blast process is fast coming to be considered indispensable. The chief merit of the process when carried forward with a first-class machine is that all rust, scale, grease and other foreign substances are removed and the clean, bright metallic surface laid bare. Pitting and all forms of corrosion are effectively reached and every vestige of rust and decay removed. There must be an intimate contact of paint and steel in order to secure an adhesion of the paint that may prove durable. A lack of such adhesion permits the entrance of moisture and gases, and these in turn develop pitting and rusting that ends in disaster to both steel and paint. One style of sand blast machine is here illustrated and while it is not suited in size for work upon large surfaces it is perfectly effective upon smaller ones and for sand blasting glass, etc. The effectiveness of the sand blast process depends upon the ability of sand used as a projectile to cut and remove the substance exposed to the blast of sand and compressed air. The machine here shown is a very powerful one for its size, and in work upon glass it is quick and thorough. As will be noted, the sand blast from the tank is acted upon by the compressed air from both the top and bottom, thus securing an unusual power. After filling tank turn off at No. 3 and No. 6. Let the water out at No. 5. Then turn on compressed air at No. 2 and No. 4. Next turn sand on at No. 6 and the machine is ready for work.

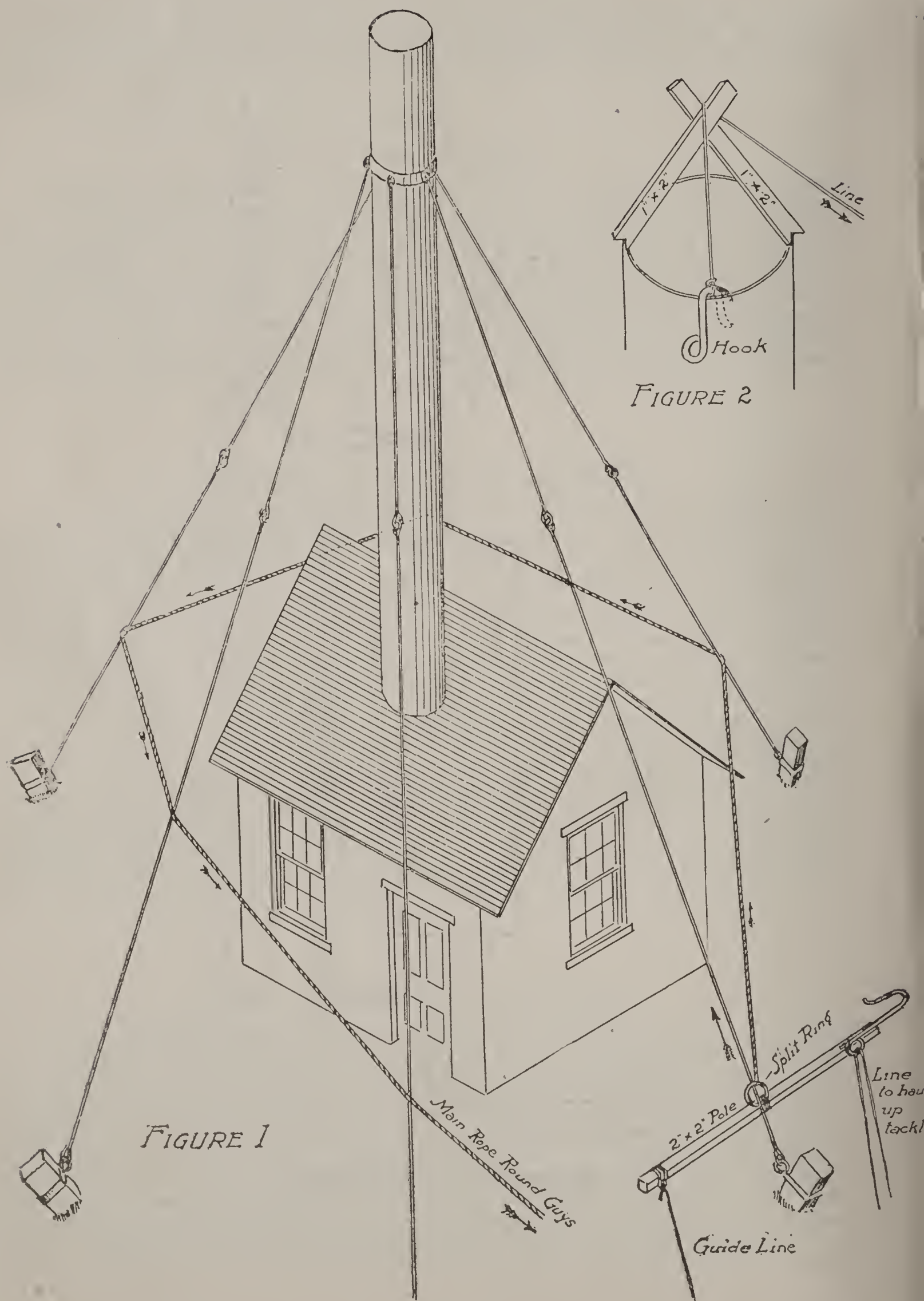
—1617—

Rigging a Smokestack for Painting.

A very ingenious method for rigging an iron smokestack for painting it that not only requires no scaffolding, but which can be done without putting out the fire, has been sent to us by J. M. Stewart, a painter of Mullan, Idaho. The method of fastening the hook over the top edge of the stack is shown in Fig. 1, which is purposely drawn out of proper proportion in order more clearly to illustrate the working details of the plan pursued. The method applies to a stack supported by guy rods or ropes, as indicated in the sketch, and this will probably include more than 90 per cent. of all the stacks that are erected. Mr. Stewart says that the first thing to do is to get a half-inch iron strap or rod and bend it into a split ring, which is put around one of the guys, as shown in the sketch. The guys, as a rule, are fastened from fifteen to twenty feet below the top of the stack. A two by two inch pole is procured, a trifle longer than twice



Machine for Sand Blasting.



this distance, and this is tied at its center to the split ring, as indicated. To one end of this pole is fastened the hook, which is to go over the edge of the stack, a long line or light rope being run through the ring of the hook in order to pull up the block and tackle after the hook has been secured to the top of the stack. Another light rope is fastened to the other end of the pole to serve as a guide rope and to manipulate the pole in order to get the hook over the edge. A long rope is now fastened to the split ring and carried round the guys. If you have plenty of rope for this purpose you can take the rope from the tackle block, putting it back afterward. Now by pulling on this rope at the point indicated and in the direction shown by the arrows the rope will slide up the inclined guys, and the split ring, with the pole and hook, will naturally move up the guy to which it is attached in the direction indicated by the longer arrow. When it has reached the point where the guy is fastened to the stack, pulling the guide rope will raise the pole to a perpendicular position, and by means of this and the double line through the eye of the hook the pole may be swung so as to get the hook over the edge of the stack, when it is dropped into position. It is then comparatively easy, if the hook has not been fastened too tightly to the pole, to bring the rope back to the starting point, and with a strong jerk pull the pole away from the hook, which is left fastened to the stack, with the small rope in the eye of the hook. The pole will, of course, slide down the guy rope. With this you can easily haul up your heavier rope and rig a boatswain's chair—the method of which is familiar to every painter.

The way to remove the hook from the stack is shown in Fig. 2. Two pieces of one by two inch wood are fastened together as shown and a line is thrown across the top and fastened to the top of the hook. This line should be held tight from the ground on the opposite side of the stack from the hook in order to hold the framework in position until the ropes have been pulled out of the eye of the hook. A quick strong jerk will then remove the hook and the wooden framework will fall into the stack, where it will be burned.

PLASTER.

—1618—

To Prepare Molds for Stucco Work and What Stucco Is Composed of.

The best material for molds for stucco ornaments is potter's clay, which is finely ground in the dry state, put through a fine wire sieve and then mixed with strong glue size to a thick batter. This is allowed to stand in a vessel until it has attained the consistency of putty; in other words, it is allowed to sweat, so that on handling it will not adhere to the fingers. This mass is then pressed into a wooden box, which, however, should be one inch longer, one inch wider and one-half inch deeper than the patten or model that is about to be cast, and which serves the purpose of confining the mass when the model is pressed into the molding clay. The figure, before pressing it into the mass, must be moistened well with water, so that none of the clay will adhere to it. As the latter is rather resistant, the pressing must be done repeatedly, until the base of the relief is on a level with the surface of the mass. At every fresh pressing the figure is moistened anew. When the mold has assumed its form, it is dried in the air, but not exposed to direct sunlight; then it is washed with clear water and coated several times with strong glue size. The glue size used with the clay has the function of keeping the form or mold unshrinkable and from cracking, and for this reason potter's clay is used instead of the pure floated clay. The mass used in casting stucco ornaments and reliefs is calcined plaster (plaster of paris), that has been put through a fine sieve and is again calcined in a suitable kettle, mixed with a small portion of bolted paris white and glue size to a thick batter. The glue size should be made with best white glue and the mass stirred until there are no signs of lumps and until it begins to become tough. Then it is firmly pressed into the form by means of a trowel and the top leveled off. When the mass has become hard, which will take about twenty-four hours, it will fall out by turning the box on its side, giving it a light tap. The resulting ornament may then be cleaned with scraping tools of proper form and should there be any defects, they may be corrected with a similar mass, applying with a brush. When all this is done and the figure dry, it is brushed over several times with a thin coating of whiting, mixed with water.

—1619—

Composition of Mass for Plaster Ornaments

Information was wanted as to what relief work, such as ornaments, corner pieces, etc., are composed of.

Calcined plaster, known in commerce as plaster of paris, is ordinarily used, and in making the mass for the cast the powder is slowly sifted into the water and not stirred until sufficient of the plaster has been sifted into the water. In place of water skimmed milk is sometimes employed. In order to make the mass set more slowly, a saturated solution of borax in water is added, or if the mass is to be made tenacious, a few parts of pulverized marshmallow root are added.

—1620—

To Harden Decorative Plaster Work for Exterior Use.

A formula was wanted for mixing calcined plaster for exterior decorations which would produce plaster casts or ornaments of the hardness of artificial marble, in order to withstand exposure to the atmospheric conditions of the various seasons.

Various authorities on the subject are of the opinion that the harder the rock from which plaster is the calcined product, the more resistant the plaster ornaments made therefrom will be on exposure. However, the decorator cannot well select the rock and prepare his own material, and therefore he is obliged to resort to other means. It has been conclusively proved that when freshly calcined plaster is placed in a solution of one part of alum in twelve parts of water and then again calcined at red heat held uniformly for a few hours, it becomes very hard when it is mixed, after cooling, with a similar solution, and will, when formed, equal some of the softer grades of marble in durability. But this again is too difficult a procedure for the decorator. The most simple method is to accomplish the thorough hardening of the plaster work, after forming, is as follows:—Take for every six parts by weight of freshly calcined plaster, one part of freshly slaked lime that has been sifted through a fine mesh sieve, and mix these ingredients in the usual manner for ordinary plaster. When the cast has been formed and has been dried thoroughly, it is saturated with a solution of zinc sulphate, but under no condition must it remain therein more than 90 minutes. After the first immersion it becomes so hard, when dry, that a finger nail will not make an impression on the surface. If the form be so large as to make an immersion too expensive, it may be saturated by repeated applications with the brush. To make plaster set more slowly and yet much tougher, after the form has hardened, in fact, so that it can be turned in a lathe, like bone, it is recommended that for every six pounds of calcined plaster, one-quarter pound of pulverized marshmallow root be used. Others have used sour milk in place of water for mixing the plaster and claim that inside of twenty-four hours the casts become so hard that they can be scratched only with a knife or other instrument of steel. To give an idea of all of the various means employed, mostly unsuccessful, to obtain lasting weatherproof results on plaster ornaments would require a large volume.

—1621—

Mixing Plaster for Repairing Center Pieces and Cornices.

How should plaster of paris be mixed for repairing or filling in defective places in fancy center pieces and cornices of rooms?

Calcined plaster (plaster of paris) sets too rapidly if simply mixed with water alone, and we suggest that you mix with every pound of the dry plaster two teaspoonfuls of bicarbonate of soda (baking powder) and then wet it up with clear water to the consistency of soft putty. If you should have to mix it with colors that are affected by alkalis use in place of the soda one-half ounce of pulverized marshmallow root, which you can procure from any druggist. When the plaster is so prepared it will permit you to smooth it down nicely, and it becomes less brittle on drying.

—1622—

Retarding the Drying and Hardening of Plaster of Paris.

Is there any preparation with which plaster of paris that has been previously mixed with water and is to be applied to walls and ceilings of large area can be kept from setting too quickly and at the same time decrease suction after drying?

The plaster of paris must not be mixed with ordinary water, but, instead use a saturated solution of borax prepared in the following manner:—Stir into one gallon of boiling water twenty ounces of pulverized borax, and when all the borax has been dissolved set away to cool; then pour off the clear liquid, which has taken up enough of the borax to make the saturated solution. To mix the plaster this solution must be extended with clear water, and the less water is added the more the hardening of the plaster is retarded, as, for instance, one part of the solution with twelve parts of water will retard hardening only fifteen minutes; one part solution with eight parts of water will retard hardening about four hours, while one part of the solution with one part water will pre-

vent hardening for twelve hours. This does not injure the plaster in any way, but it will not stop suction in the plaster. To stop suction, glue water should be used with the borax solution in place of the clear water. There is still another process to retard the too rapid setting or hardening of plaster, which at the same time imparts extraordinary toughness to the finish and prevents cracking. To twenty pounds of plaster of paris add one pound finely powdered marshmallow root and mix intimately before adding the clear water. The borax, as well as the marshmallow root, can be secured from any wholesale drug house, and the expense is only nominal, considering the advantages derived from the use of the materials named.

—1623—

To Retard Setting of Plaster of Paris.

Adding some glue water to plaster of paris prevents it from setting too quick. Any painter knows the annoyance caused by too quick setting of plaster of paris, especially if the wall should be covered by many small holes and cracks, necessitating much time to fill them up. Glue water is not always at hand, involving extra trouble to warm up glue, etc. In such cases use a mixture of about one-fourth of vinegar and three-fourths of water to mix plaster with. The vinegar keeps the plaster soft for a long time, and when it sets, it sets very hard.

To retard the drying of plaster of paris, the simplest method I have found is to use a weak glue solution instead of water for mixing the plaster. The time of setting will depend on the proportion of the glue that you use. Why, you can handle the plaster for hours afterward, if you are careful. After a little experimenting you will be able to adjust the strength so you can make the plaster remain soft for any desired time.

The Veteran Painter.

—1624—

Liquid for Coating Damp Inside Walls.

A coating was desired for a damp wall in a store which will permit the paperhanger to paper the wall and have the paper adhere. He wished to avoid going to the expense of battening the wall.

We would suggest to try the following, which, although we cannot guarantee permanent results, strikes us as a simple and effective means to dry up moisture that does not strike through from the exterior. Make two solutions as follows:—No. 1. Dissolve six pounds chloride of calcium in two gallons of soft water, settle and strain. Test with Beaume hydrometer, and if heavier than 20 degrees, add more water; if lighter, add more chloride of calcium. No. 2. Reduce one gallon concentrated silicate of soda (water glass) with one gallon hot water. Mix it well and strain. When cold, test same as No. 1, and if the specific gravity is heavier than 20 degrees Be., add more water; if lighter, add more water glass. Both of the solutions should be kept in bottles or jars.

Before using the liquids on old walls, all the paper, paste, whitewash or loose plaster must be removed with hot water. New walls do not require this treatment. Apply with a large wall brush solution No. 1 and immediately afterward solution No. 2, and if not dry in two or three hours, follow with a second coat of No. 2, but bear in mind that solution No. 1 will be of no use whatever unless followed by solution No. 2. One gallon of each will be sufficient for 150 to 200 square feet, unless the wall is very porous. On this preparation wall paper, whitewash or distemper is said to hold very well, the surface becoming hard as stone.

—1625—

What Is Stucco Composed Of?

The best stucco is said to be composed of plaster of paris (calcined gypsum) that has been steeped in a saturated solution of alum and recalcined, then reduced to a powder. For use as a stucco, it is mixed with water, same as the ordinary plaster of paris.

—1626—

How to Prepare Plaster of Paris Ornaments.

If your molds are made of wood or plaster, they should be coated with shellac varnish first, so as to prevent all suction, but this coating must be thin and evenly applied, so as not to fill up fine lines in the model. Next a coat of a mixture of oil and soft soap is given, which will allow the cast to come out of the mold readily. Plaster molds that are not to be oiled may be made non-porous with one or more applications of a strong size of soap. Molds or models of metal that have a smooth surface require no coating, while models, such as antique marble ornaments, that must not be oiled in order to prevent spotting, may be covered with very thin tin foil before taking a cast.

To be successful in making plaster ornaments the following points must be observed carefully:—The mold must be so constructed that the cast can be removed without breaking any of its fine lines, that molds of wood or plaster must be shellaced to prevent suction, and greased with a mixture of non-drying oil and soap, that the plaster must be carefully selected and its quality ascertained by making a test in a small way. When mixing the material for a cast, the water must not be poured on to the plaster, but the plaster must be slowly stirred into the water until the proper consistency is obtained, which method prevents lumping. To slow up the hardening of the plaster cast, a saturated solution of borax is employed in place of clear water. One part of solution to twenty parts water retards hardening ten minutes, one part of solution to ten parts water retards hardening for forty minutes, while equal parts of solution and water will retard the hardening for at least eight hours. A saturated solution of borax is prepared by dissolving borax in boiling water and, after allowing the solution to cool, pouring off the clear liquid from the crystalline sediment, this liquid constituting a saturated solution of borax in ordinary temperature.

Borax retards the rapid hardening of plaster, but the addition of marshmallow root not only retards quick hardening, but toughens the mass in a remarkable degree. Two to four per cent. by weight of finely pulverized marshmallow root added to 96 or 98 per cent. of plaster of paris and worked into a paste with 40 per cent. water will not allow the mass to harden for one hour, and make it so tough that when finally hardened it may be cut, turned, filed or drilled. A larger percentage of marshmallow root will retard drying and hardening still more and impart still greater toughness to the mass, so that it may be rolled into thin sheets on glass plates with an ordinary rolling pin, that will not crack on drying and may be rubbed to a polish. After drying this mass may be colored with water colors, varnished, rubbed and polished, and by such process made waterproof.

—1627—

Retarding the Setting of Calcined Plaster.

There are various ways to accomplish the object. For instance, the addition of powdered marshmallow root to the plaster before mixing with water is said to be an excellent means and four parts by weight of the powder to ninety-six parts by weight of the plaster will retard the setting for about twenty minutes. Of course, much depends on how recently the plaster has been calcined. A much simpler method, however, is to make a saturated solution of borax and use this with certain volumes of water in mixing with plaster. The solution of borax is made

by dissolving an excess of borax in boiling water, allowing the solution to cool, then pouring off the clear solution from the crystals that did not go into solution. If one volume of borax solution is added to twelve volumes of water it will retard the setting or hardening fifteen minutes, one volume borax solution to eight volumes of water thirty minutes, one volume solution to four volumes of water from three to four hours and equal volumes of solution and water eight to ten hours.

—1628—

Composition of Plaster for Interior Walls.

Usually plastering is done first with what is either called fine stuff or coarse stuff. Fine stuff is prepared by slaking builders' lime with water to a paste and then to a cream, when it becomes stiff by the evaporation of the water and is ready for working. This is called slipped coat, but is also ready for finishing, when mixed with plaster of paris for hard finish or sand for sand finish. Coarse stuff is made from two parts of lime and four and three-fourths parts sand with one-fourth part hair. Gauge stuff or hard finish is composed of from three to four parts fine stuff and one part plaster. Cheaper grades of plastering are often finished with a lime skim coat containing very little plaster of paris, if any. A chemist can determine how much lime and how much plaster is in the material you speak of, but you cannot refuse to accept the job, as you have no specifications for the composition.

—1629—

To Keep Plaster from Spotting and Shelling on Hollow Tile Walls.

We have heard numerous complaints where hollow tile walls gave trouble by throwing off both plaster and paint, due to moisture coming through to the inner surface from the hollow air space, the moisture coming up from the very foundations, but we have not heard of a case such as you describe. Whether this is due to the material of which the tiles are made or to imperfect plaster, of course, we cannot say, but should think that if the plaster were removed as far as possible and the surface given an isolating coating before plastering it would stop any striking through that may be caused by the material in the tiles. Probably the tiles were burnt with coal containing an excess of sulphur, which may have dissolved when the plaster was applied or the soluble salt of sulphur and iron may have been liberated by moisture and so stained and disintegrated the plaster.

The isolating wash we refer to consists of two solutions as follows:—

A. Dissolve 25 pounds calcium chloride in 10 gallons of water. Let the solution settle and strain the clear solution through cheesecloth.

B. Mix 7 gallons silicate of soda of 33 degrees Be with 3 gallons hot water. Let the solution cool, then strain.

Apply solution A and without waiting for it to become thoroughly dry, apply a coat of solution B, and if this is not dry inside of 3 hours, apply another coat of same. This will hold back moisture, as well as chemical salts.

WINDOW SHADES.

—1630—

Window Shade Cutting.

Measuring for and making shades is quite a simple matter. The main thing is to be accurate in the measuring and cutting. First of all we should have a cutting table, which should be at least ten feet long by about four and a half feet wide, with a drop leaf at the end to be used in emergencies when extra long shades are to be made. (Figure 1.)

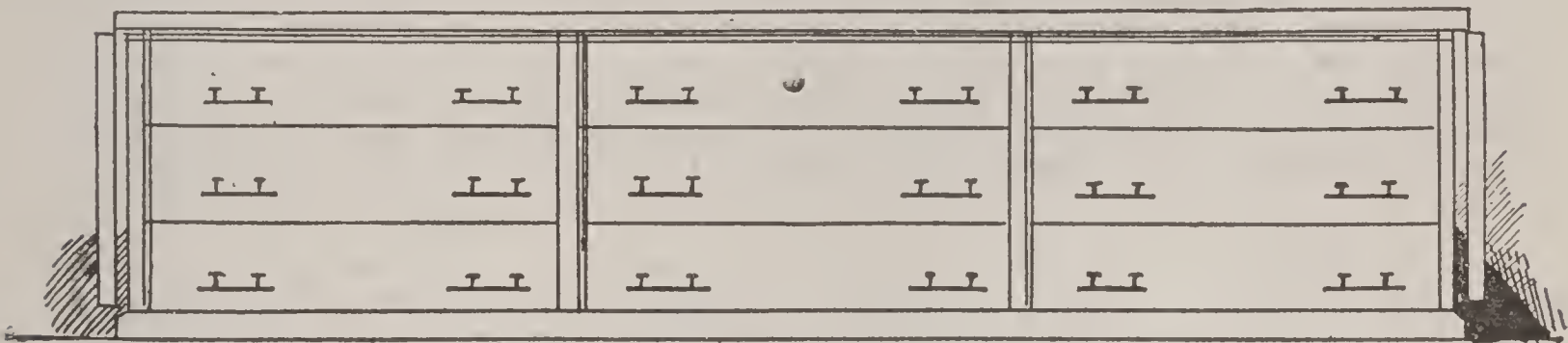


Figure 1.

While this sketch shows a very complete table there may be some objection to it owing to the fact that it takes up too much room. In emergencies of this kind we would advise that a folding table be made as follows:—Have two boards made each ten feet long by two and a quarter wide, have these properly battened and hinged in the same manner as a paperhanger's folding table. When in use they can be placed upon wooden horses and when not in use can be folded and laid aside. The first thing to do is to mark off the top of the table into feet and half feet, using a straightedge and a pencil to mark them off with; after which paint the lines indicating the feet in black and the half feet in red, and also mark the numbers of the feet and half feet so that they could always be plainly seen when measuring your cloth. Commence the numbering at the right hand so that when unrolling the stuff you can always cut it the desired length without much trouble. The following tools will be necessary to begin business with:—Four long awls, one pair large scissors, one paperhanger's knife, a well-worn screwdriver and a straightedge, as long as the board, made of any kind of wood, but preferably of cherry, to be three inches wide and one inch thick.

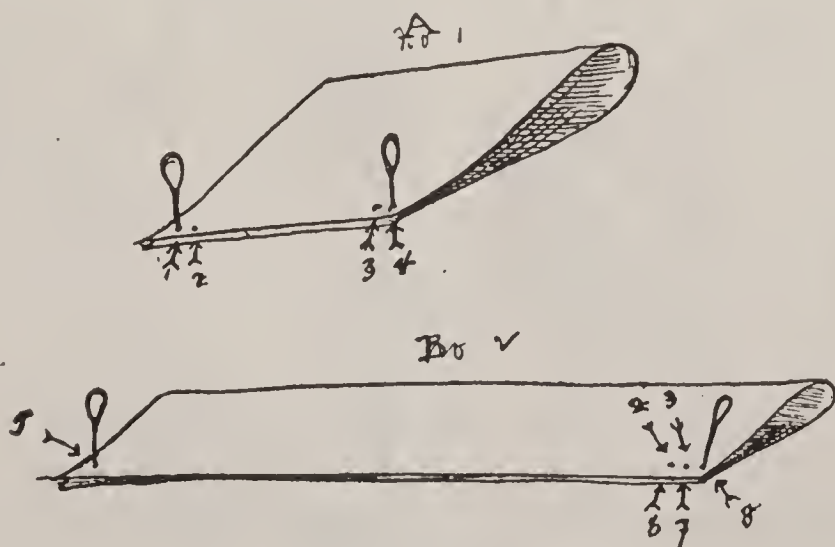


Figure 2.

To make the shades, we will say that we have to make some of the following size when finished:—Six feet six inches long by two feet eleven inches wide. You place your roll of shade material, which should be at least three feet wide, on the table and cut off a piece seven feet long. You will notice that this is six inches longer than the measurement of the shade desired, the extra length being an allowance for the bottom hem and the top lap and also a small allowance of material to wrap around the roller when the shade is pulled down to its full length, this being advisable for fear of pulling the shade off the roller if the measurement is made scant. After cutting the shade, as we have described, seven feet long, you will proceed to square it as follows:—Lay the material flat upon the table, then take your four long awls and stick one into each corner of the material to hold it fast to the table. We have said that the shade is to measure when finished six feet six inches by two feet eleven inches. In order to indicate this measurement on the shade, you remove two awls on one end of your material over, bringing the top over to meet the bottom, fastening them together with the two awls that are already sticking into the corners so that it will appear as in Figure 2 at A. Then you lay your yard stick on this and mark off three feet one inch, indicating the same by sticking your two awls in the two extreme points. This is the width of the shade with two inches added

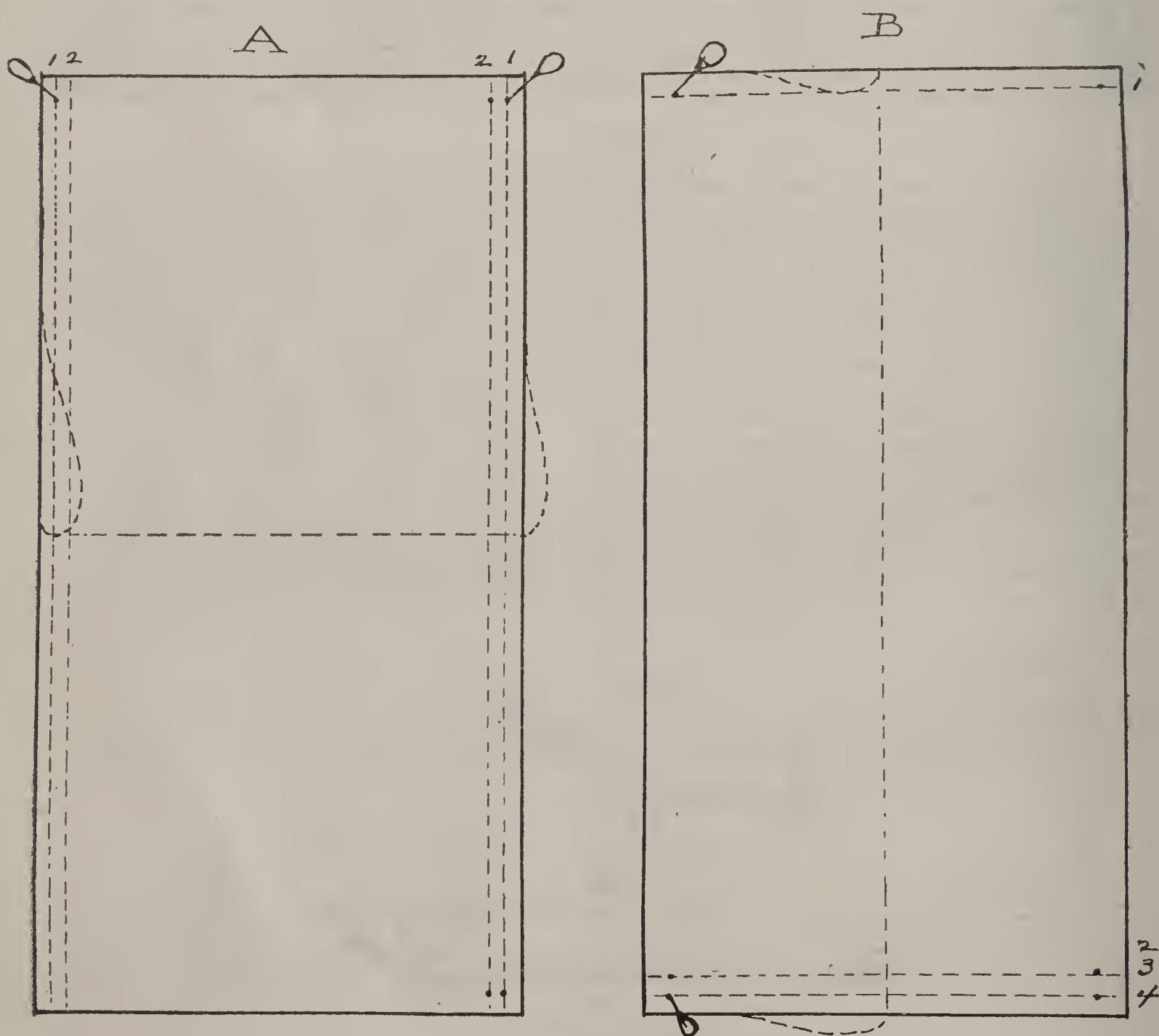


Figure 3.

allowing for a one-inch hem on each side. To indicate the width of the hem and at the same time the width of the finished shade, measure one inch on each side of the perforations already made, indicating them also by sticking the awls through the material instead of marking with pencil, taking care all of the time that you have not moved the position of your material. You have now by this simple method indicated the width of your shade and also the width of the hem on the sides. To square the top and bottom is equally simple, as follows:—After having replaced the material in its former flat position, you fold your material lengthwise (Figure 2 at B) and fasten it together at the corners by sticking an awl at each of the two opposite corners (top and bottom), thus holding it in position while you make the following marks with the two remaining awls. First stick one of your awls into the material about an inch or two from the edge on each end. These marks square the top and bottom, respectively. The bottom hem or pocket for slat is made first by marking with the awl one perforation, about one-half inch from the squaring mark, to indicate the lap, and then one more perforation about one inch and a half from that, to indicate the hem or pocket. This completes the marking of the bottom, the top having been already marked by the one perforation marking the squaring point. The most difficult part of the work is now completed, the cutting being a very simple matter. To cut the shade according to the marks made proceed as follows:—Replace your material in its former flat position, all four corners being held down securely by the awls; place your straightedge in position upon the material in a line with the outside dots or marks and keep it in position by placing the two nearest awls into the two places indicating where the shade is to be cut (the two outside marks), then take your knife and cut the material, holding the straight-edge down tight on the table by pressing it with the left hand, with the knife,

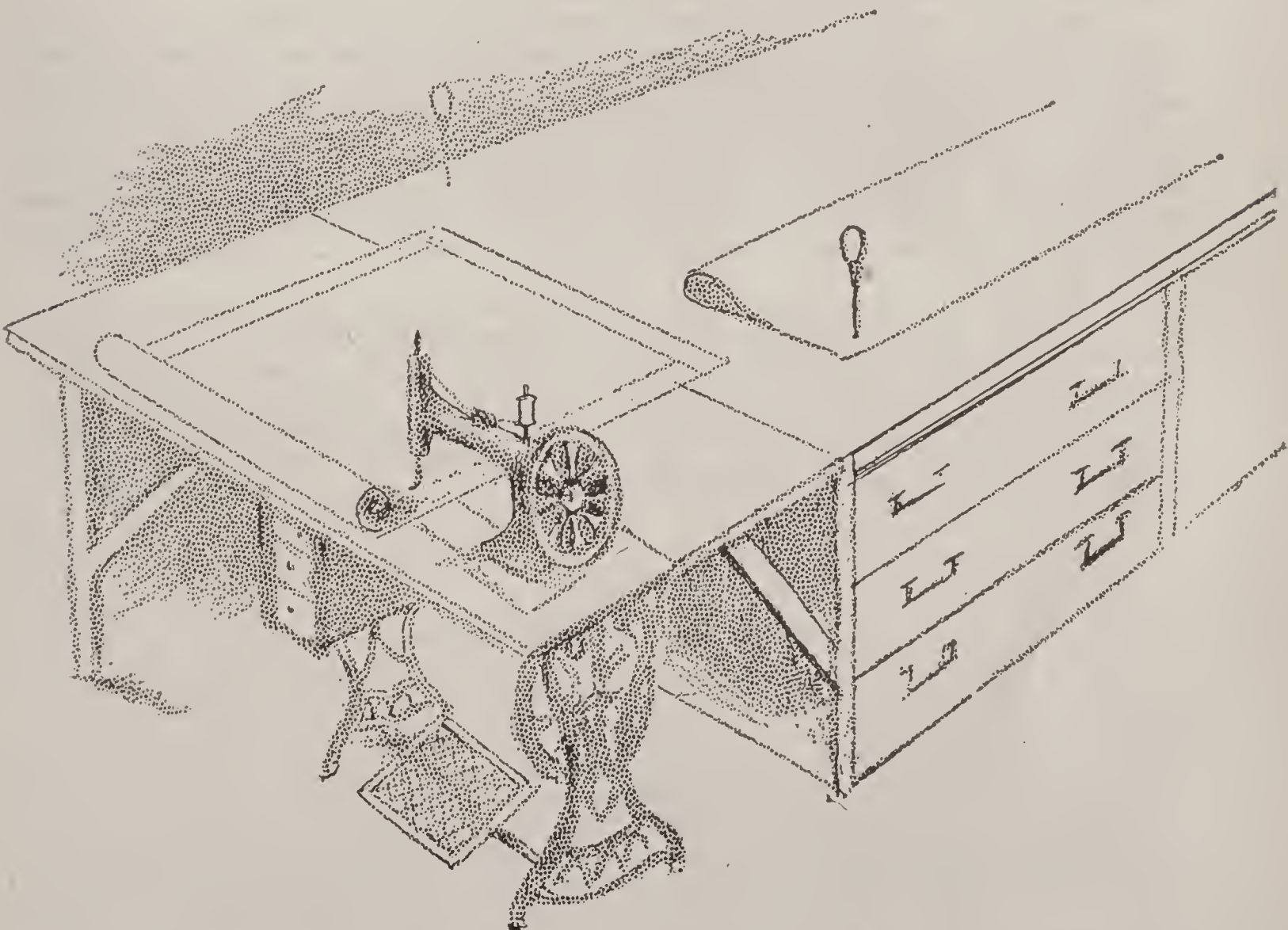


Figure 4.

of course, in the right, and using the outside or nearest edge of the straight-edge as a guide to run the knife along while cutting the shade cloth. You next move your straightedge back or from you until you come to the next mark or perforations, which are one inch from where you have just cut, holding it in position as before by placing the awls in the perforations previously made. Now comes the moment when you use the blunt edge screwdriver that we mentioned, and the use of which has no doubt excited your curiosity. You take the screwdriver in the right hand in the same manner as if it were a knife, holding the straightedge as before and run the screwdriver along the nearest side of the straightedge, making a crease which will enable you to fold your hem without difficulty. You can now see why we recommend the use of a well-worn screwdriver as it would cut the material if new and sharp. Repeat this method of cutting and creasing on the opposite side and on both ends, with the exception that upon the upper end you do not cut any at all, merely making a crease with the screwdriver as before indicated. To make the foregoing more clear, I refer you to Figure 3, showing where the perforations should be made. At A of this figure you will see two rows of dotted lines, one row on each side. No 1 on each side indicates where the shade is to be cut and No. 2 indicates where it is to be creased for the side hem. In the right hand diagram the positions of the lines are reversed, viz., being on top and bottom in place of at the two sides. No. 1 indicates the crease at the top. No. 4 indicates where it is to be cut at the bottom. No. 3 where it is to be creased for the lap or pocket for slat.

The reader will understand the simplicity and accuracy of this method by experimenting with a piece of paper, folding, perforating, cutting and creasing and thus proving to his own satisfaction the improvement that he will find this to be over the old method, and without the consequent waste necessarily attached to experimenting with shade material.

Having cut and pressed the shade, according to the foregoing instructions, it is all ready for sewing. Here again we have an improvement. Shades were formerly sewed by hand, but now they can be more readily and better done by machine. Any ordinary sewing machine can be adjusted to sew window shades. A person accustomed to adjust machines can adjust the tension sufficiently to make a long or short stitch, or the better way would be to take it to the machine shop and have it properly adjusted for a trifling cost. Ordinarily the machine will sew a plain running stitch, but appliances can be purchased for fancy stitching, one of the most popular being what is known as the zig-zig or her-ringbone.

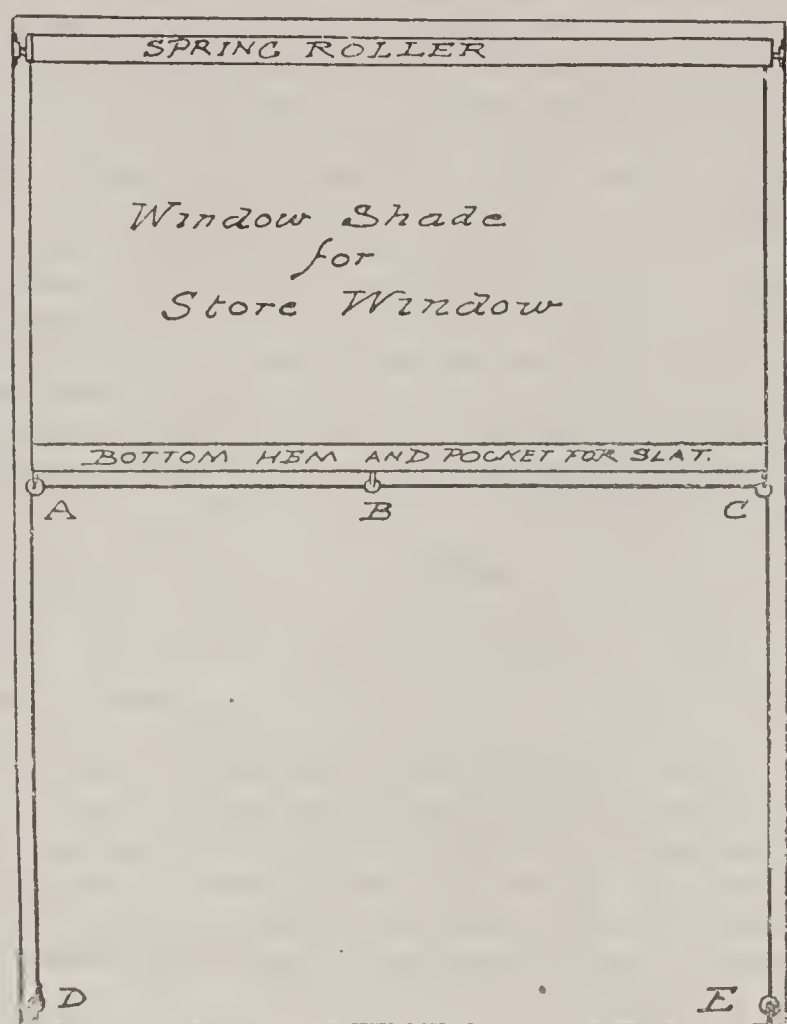
It will be a good plan to have the shade table made low enough to allow the machine to be placed alongside of it so that when the operator is sewing the shade can be rolled off onto the table, thus preventing the danger of soiling by its being permitted to fall upon the floor. In Figure 4 we submit a suggestion. You will see by this plan that one of the drop leaves has been cut out, so that the machine can be fitted into it. This you will find to be a good arrangement as the shade can be rolled off onto the table.

R. N. Hunter.

—1631—

Shade for Store Window.

The making of shades for store windows is often quite a problem. There are many peculiar conditions which are radically different from the window of a dwelling. Store windows have to be fitted, in most instances, with shades so arranged that they can be raised and lowered from a position in the interior of the store at quite a distance from the shade itself, and it is almost always desirable to so arrange the cords that they may not be seen from in front of the window. There are many ways of accomplishing this result, but the best that the writer has found is shown in the diagram. This shows a shade unrolled to half of its length. As will be seen, it is hung from a spring roller and has a wide hem or pocket at the bottom for the slat. At A, B and C will be seen three little brass pulleys; at D is a nickel-plated screw eye where the end of the shade



cord is fastened and then run through the pulleys at A, B and C and carried from them to the ratchet pulley at the bottom right-hand side of the window (See E). This plan may also be used for office windows where it is desired to have the shade at the bottom, it being necessary, however, to reverse the arrangement of the shade and screw eyes, etc.; the screw eye and ratchet pulley being placed on the ceiling of the window instead of the floor.

R. N. Hunter.

—1632—

Repainting Old Window Shades.

A method was desired for repainting old window shades. Ordinarily it does not pay to repaint old window shades, except where they are hand-made and only faded, but otherwise well preserved. Use stiff ground white lead as a base for white and all tints, mixing tints with stiff ground colors, such as chemically pure chrome yellow, chrome green, ultramarine blue, red oxide, etc., but avoid ocher, Venetian red and other earth colors, of which too great a quantity is required to produce the necessary tint or shade; and above all, do not use zinc oxide. Thin the stiff mixture with a trifle of drier, and all the benzine necessary, to a thin wash, and after the shades have been cleaned, stretch them on a frame and rapidly coat either side with as wide a wall brush as you can handle, but do not go over the same space more than once to avoid "shiners."

—1633—

Painting Window Shade Cloth.

A painter tried the foregoing formula for repainting old window shades, but found that it rubs off and that the binding properties are defective. He asked to know what is used by shade-cloth makers.

He probably mixed the paint most too stout, whereas it should be almost as

thin as water, not a paint, but a mere stain. If the tint is very light it is well to add a little extra linseed oil, raw preferably, with the paint, but when much color is used, as in olive greens or light browns, etc., there is sufficient oil present to hold on. The old shades should be first scrubbed with water and soap and allowed to dry, which will make the old hard paint more apt to permit the new wash or paint to get a good hold. The writer has repainted quite a number of old hand-made shades in this way with the best success in such tints as straw color, canary yellow, light and dark olive greens and in blue tints. As to the material used by shade cloth manufacturers, they have used up to a recent period pure white lead only for hand-painting, while for machine painting they have employed various combinations of white lead and whiting, or clay or zinc sulphide. They do not publish their formulas, which is the reason why information regarding the subject is so meager. But with a little practice in mixing the paint material it will be comparatively easy to establish the proper formula with the right binding properties.

—1634—

Repainting Faded Window Shades in Durable, Rich Red.

In repainting shades, more of a stain than an opaque color is required, as paint would make the shades too unwieldy for rolling. Stretch out the shades on any roughly made frame, tacking down at the ends, procure a fast red, which is found in commerce under the name of Permanent or Para red or use Permanent red lake, add japan sufficient to give drying and binding quality, thin with benzine to the consistency of water and apply with a soft wall brush on both sides of the shade cloth. Work quickly to avoid streaks. Very little color is required. Put on a second coat if the first is not satisfactory.

—1635—

Repainting Window Shades of Cloth.

There is only one material that will serve well for repainting window shades, and that is pure white lead where tints come into question. Zinc white is too brittle, and is very apt to crack at short notice in the rolling up. Put your curtains or shades, after they are removed from the roller and after fringes, etc., have also been removed, on a table or a couple of boards laid on trestles, and give them a thorough scouring with soft soap and water, and when clean a second scouring with clear water, and while still wet fasten them to a convenient frame with tacks, so that both sides can be painted without waiting for either to dry. When the water has dried apply your paint with a wall brush as wide as you can find quickly and deftly. Do not go over it more than once or you will have "shiners" and window shades should be dead flat. Mix your tints from white lead in oil and the required colors in oil, thinning with benzine only, adding a trifle of drying japan only, and have the paint almost as thin as water. In tinting avoid ocher as much as possible, unless very little only is required. It will scarcely pay to repaint any but the better grade of hand-made opaque shades; the others will not stand it.

—1636—

Repainting Window Shades.

As window curtains or shade cloth must not be brittle, because the paint should not break when they are rolled, the use of zinc is out of the question, and while a quarter of a century ago all opaque shade cloth was painted with white lead as the base for tints, the base is now made from lithopone in oil, tinted with the necessary coloring matter to produce the desired effects, while for the solid colors, such as greens, yellows, etc., they are extended with china clay and

whiting or other soft inert material. The paint used by shade cloth makers for hand painting is usually ground to very stiff paste form, then thinned with japan drier and quite a large portion of benzine, so as to dry nearly if not quite flat and the sized cloth coated on both sides with very large brushes. For machine painted cloth the paint is made still thinner, almost like a water stain and the cloth is run through a tank over rollers and before leaving the tank the cloth runs through a pair of revolving brushes, that divide the paint uniformly, and the cloth is thus covered on both sides in one operation, being pulled over rollers in long frame runs where the paint dries rapidly, being fanned by currents of air from blowers.

The usual method for repainting window shades is to have frames of proper size, on which the cloth is stretched, dusted or washed with soapsuds and water and in the latter case permitted to dry well. For white it is best to use pure white lead, while for tints lithopone and strong color in oil may be used; for solid effects in red, blue green or yellow pure oil color is best, so that a very thin paint or stain will cover up in one coat work. Turpentine is better than benzine for good flatting.

—1637—

White Lettering Peeling from Heavy Curtain.

Cause of paint peeling off from curtains where the paint was mixed white lead in oil, with equal parts raw linseed oil and turpentine, a little drier, and a little demar varnish:—

The trouble is that the paint does not take hold on the surface. The curtain is made of heavy fabric, coated on one side with a waterproof black material, similar to Pantasote. While not exactly greasy, it is so smooth that the paint cannot take a grip on it, unless it is first rubbed over with some spirit to deaden the luster or "sheen." Moisten a soft sponge with alcohol (denatured spirit will answer) and rub slightly over the stencil. Evaporation will be rapid and there will be a deadening of the luster, where the alcohol has touched, enough to give the paint a hold on the surface. A trifle of the black will rub upon the sponge, but not enough to alter the coloring of the curtain, and even if so, it will do no harm, as the letters would cover any appreciable rub up. This is one suggestion we may make. The next is, that you discard white lead in oil and in its place use white lead ground in a special very pale vehicle, usually composed of a mixture of extra pale rubbing varnish, bleached linseed oil and turpentine, an article usually found in paint manufacturers' list of coach colors, under the name of flake white or chremnitz white. If you reduce this paste white with turpentine, adding a small portion of pale coach varnish or bleached oil, you will have a good elastic stenciling white, that will dry far better and yet be elastic; at any rate, it will take a hold on the surface of the curtain.

DRIERS.

—1638—

White Liquid Driers and Theory of Drying.

Pale liquid driers or pale (so-called white) japans are really never water white or free from all color, nor are they very strong in their action, because sufficient heat cannot be applied in their manufacture to impart to them the hardness required to induce the rapid drying of oil paints.

A transparent japan may be made by dissolving in a hot bath 4 ounces of bruised gum copal, very pale kauri gum in 2 pounds turpentine, and $1\frac{1}{2}$ pounds oil of lavender, with $\frac{1}{4}$ ounce gum camphor. This is used for japaning tin, but may be used as a drier also.

For a good pale liquid drier, which although not water white, but which will not discolor white paint to any degree, we suggest the following:—In a copper kettle over a moderate fire fuse 25 pounds W. W. or W. G. rosin with $2\frac{1}{2}$ pounds litharge and $1\frac{1}{4}$ pounds white sugar of lead, but keep the mass well stirred so that it will not become discolored. When the mass has become liquid and well mixed, add gradually while stirring, one gallon of clarified linseed oil, that has been well warmed, and boil at low heat, until the mass becomes stringy and all the litharge and sugar of lead have been taken up. Place a few drops on a slab of glass and when it becomes brittle and hard on cooling, take kettle from fire and thin with five gallons of turpentine, adding small portions at first to avoid too great a loss of this solvent by evaporation. Allow to cool and settle for at least a week, then decant carefully, so as not to stir up the sediment. This makes an excellent drier for white and delicately tinted interior paint. The theory of the action of driers is that the lead or manganese salts impart drying properties to the oil in the paint to which they are added by acting as carriers of oxygen from the air to the oil.

—1639—

The Difference Between Japan Driers and Oil Driers.

Japan driers differ from oil driers in so far as the first named are composed of gums or resins fused with linseed oil and driers such as litharge, red lead, sugar of lead and manganese salts. Oil driers should not contain any gums or resins, but only linseed oil and the driers referred to, boiled until the proper consistency is obtained. Both are reduced to fluidity with turpentine or benzine or a mixture of these solvents. Oil driers are, or should be, used for oil paints on exterior work, because, being free from resinous substances, they tend less to the cracking of paint than the excessive use of japan driers, while on the other hand, the latter should be employed where quick drying, as in flat or semi-flat paints, is an absolute necessity, and where surfaces are not exposed to serve weather conditions.

—1640—

Use of the Resinates of Lead and Manganese.

Modern varnish makers do not employ resinates of lead, manganese or lime as such, but use these materials as it suits their convenience directly during the process of manufacture, thereby obtaining similar results in a more economical way than by first purchasing or preparing the same in fused or powdered form. Resinates of lead, manganese or lime as articles of commerce are used by those who have neither the apparatus nor knowledge for the manufacture of varnish for hardening cheap mixtures of rosin, oil and turpentine or benzine and also as driers for linseed and other oils. The so-called "bung-hole" boiled oil is often prepared by dissolving lead resinate or manganese resinate in petroleum spirit and adding a portion of the resulting liquid to raw linseed oil.

—1641—

Why Are Litharge and Gum Used in Coach Japans?

It is not necessary to use "flake" litharge or "flake" shellac in coach japans, any other good kind of litharge will serve the purpose, while any kind of shellac or other hard gum may be used in coach japan. The function of the litharge is that of a drier; that is, it is introduced in order that it may act on the linseed oil and give it increased drying properties, while the gum is introduced to give increased binding qualities, toughness and hardness to the japan. Oil driers or turpentine japan require none or but very little gum, but a coach japan has the function in coach colors, which linseed oil and driers have in oil paint, and is expected to dry rapidly and with a great degree of hardness.

The price of gum shellac in any form has increased nearly threefold during the last six or seven years, and it stands to reason that no sensible varnish maker, who is compelled to meet competition, employs gum shellac in coach japan or any other kind of japan.

—1642—

Japanners' Gold Size.

We know of two formulas for this material, the simpler of the two being as follows:—Boil one gallon of linseed oil; when at the boiling point add four pounds of bruised gum animi. Continue the boiling for four hours, then add one-quarter pound white sugar of lead in powder, and when this is well dissolved take kettle from fire to safe distance and add, while stirring the mass, one and three-quarters gallons spirits of turpentine, and when cooled down somewhat strain. Another formula, which we believe to be far better, is to boil in one kettle ten gallons of well-settled linseed oil for three hours, then adding, in small portions, a little at a time, while stirring the oil, seven pounds each of red lead and litharge and three pounds of copperas. When all these drying mediums have been introduced the boiling should be continued for two or three hours longer. While this is going on there should be melted in another kettle twenty pounds gum animi, into which four gallons hot linseed oil is run, and this should be run into the kettle with the boiling oil and the whole mass boiled for some hours, until it begins to string, i. e., drops off the stirring rod in large drops. Now it is permitted to cool down some, which takes an hour, minutes. However, you can obtain good japanners' gold size from any reputable varnish manufacturer or your supply house can obtain it for you if they do not keep it in stock. When the size is flowed on a strip of glass that is allowed to drain the film should dry inside of twenty minutes and be clear.

—1643—

Patent Driers.

Twelve pounds barytes, 2 pounds whiting, 8 ounces dry white lead, 20 ounces sulphate of zinc, 8 ounces litharge, 16 ounces acetate of lead, 40 ounces boiled oil. Mix the solids together by sifting and then made into a paste and grind up with the oil.

H. C. Standage.

—1644—

Paint Driers.

Ingredients:—Five hundred and sixty pounds white barytes, 784 pounds paris white, 1 pound white lead, 12 gallons strong boiled oil, $3\frac{3}{4}$ gallons drying liquor. The drying liquor is prepared by dissolving in 30 gallons of water 28 gallons acetic acid, 25 gallons acetate of lime, 28 gallons of sulphate of man-

ganese, then proceed to incorporate the above ingredients as follows:—Put 224 pounds of paris white into an edge runner or pug mill and mix to a paste with drying liquor; when well mixed, put in the barytes and remainder of the paris white and add the boiled oil, a little at a time, and work up for an hour or put through a pug mill, then put through a roller mill. *H. C. Standage.*

—1645—

Lead Drier for Paint.

Mix by sifting and then grind up in the oil the following ingredients:—Twenty-seven pounds acetate of lead, 7 pounds terra alba, 7 pounds oxide of zinc, 1 gallon refined linseed oil. *H. C. Standage.*

—1646—

Terebene Drier.

Mix together and keep at a temperature of about 300 degrees F. 140 pounds boiled linseed oil, 84 pounds rosin, 56 pounds litharge, 13 pounds resinate of manganese, and when sufficiently cooked allow to cool and thin with 700 pounds turpentine. *H. C. Standage.*

—1647—

Manganese Drier.

A cheap drier of this class is prepared by mixing together in fine powder 100 pounds terra alba, 10 pounds borate of manganese. A more expensive one is prepared by mixing as above 24 pounds barytes, 60 pounds oxide of zinc, 80 pounds borate of manganese. These powders are used by sprinkling a little of the powder into the paint. *H. C. Standage.*

—1648—

Siccative Courtray and Siccatives in General.

A sign writer and decorator writes as follows:—In the old country, where I learned my profession, we had no such materials as japans or japan driers. We used siccatives of various makes, most prominent among them being that known as “Siccatif Couetray.” It came in tubes and was used by artists in oil painting, as well as by decorators. It was dark amber to brown in color and semi-liquid in consistency. Can you inform me how this material is made and what siccatives are?

As you are doubtless aware, the word “siccative” denotes drying and in painter’s parlance a siccative is a drying agent for oil or oil colors. Certain lead salts and manganese salts, or compounds, when added to linseed and other drying oils, especially during the boiling process, give up their oxygen to the oils and so enable them to dry more rapidly. Siccatif Courtray is a combination of two siccative oils, one of which is boiled with an excess of litharge, the other with an excess of manganese borate to very heavy consistency. While still hot the two are mixed in certain proportions and thinned to proper consistency with spirits of turpentine and permitted to cool and settle. By this means the semi-fluid becomes clear, because the excess of lead and manganese settles to the bottom of the tank. European authorities warn artists against the too liberal use of this strong siccative, because with many colors, such as, for instance, quicksilver vermilion, cadmium yellow, lithopone, etc., any drier containing lead salts is apt to blacken them. Siccatives in general are simply linseed oil boiled at high temperatures and with excessive quantities of lead or manganese compounds to thick consistency, with considerable toughness, which are thinned to flowing consistency. Before thinning the material is termed concentrated oil drier.

—1649—

Patent Knotting.

Digest together 3 pounds orange shellac, $2\frac{1}{2}$ pounds japanner's gold size, 1 gallon naphtha. Shake up frequently until the shellac is dissolved.

H. C. Standage.

—1650—

Driers That Will Not Impair Elasticity or Flexibility.

What sort of drier can be employed with oils added to hydrocarbons in a paint that will not detract from the flexibility of the latter?

What is needed is a strong oil drier or a strong drying oil similar to those used by the makers of oilcloth or linoleum, but if so, do not look too sharply at first cost. Such a drying oil is best prepared as follows:—In a portable copper kettle of, say 80 gallons capacity, place 50 gallons of pure raw linseed oil (varnish makers' raw oil is best and only costs a few cents more per gallon than the ordinary brands) and heat the oil over a coke fire, gas coke if possible, to the point of boiling. A thermometer should be placed in the kettle and when the temperature is up to 250 degrees F., sprinkle in slowly, while stirring with a rod such as is used by varnish makers, a mixture of $7\frac{1}{2}$ pounds powdered litharge, $7\frac{1}{2}$ pounds powdered red lead and 3 pounds finely powdered black oxide of manganese. It should require fully forty-five minutes before the total 18 pounds of drying compounds are finally introduced, by which time the temperature should have risen to 360 degrees F. or over. Now the heat should be allowed to rise to about 520 or 540 degrees F. and held at that point for at least three hours, keeping sides and bottom of kettle free from sediment or crust by frequent stirring; then remove kettle from fire for a while until cooled down to about 400 degrees, place again on fire and let the oil simmer at that temperature for, say about two hours more. Then raise the heat again to 500 degrees F., or a little over, for about thirty minutes and remove kettle from fire to cool. This will produce an oil of excellent body, though a little dark, which, however, will do no harm for your purposes, that will dry, when flowed on glass, in from eight to ten hours by itself. This is what may be called the base for a pure linseed oil varnish, that which the French call "verniss," or the German "firniss," and when thinned down some with spirits of turpentine it would equal the varnishes of the early part of the nineteenth century. The "fire" or "kettle" boiled oils, which appear to be going out of date, were boiled in a similar manner, but they were known as "lead boiled," or "manganese boiled," according to the nature of the drier used. The maximum amount of red lead used in commercial lead boiled oil was three per cent. of the weight of the oil, and for manganese boiled oil one and one-half per cent. of dioxide of manganese was the limit. If both lead and manganese were used the maximum was two per cent. litharge and one per cent. dioxide of manganese.

—1651—

Oil Driers in Exterior Paint vs. Japan Driers.

Are oil driers better to use on exterior painting than japans or japan oil, and what proportions would we advise to use with the paint in cold and in warm weather? Also would oil driers bind the lead and linseed oil firmer than japan driers?

The term oil drier indicates liquid driers made by fusing lead salts, such as litharge and red lead or lead acetate, either alone or along with manganese dioxide and linseed oil, thinning this base with either spirits of turpentine or benzine or a mixture of these. Drying japans or japan driers are made by fusing lead and manganese salts or either of these singly with gum copal or ordinary rosin, adding linseed oil and thinning as above. In the cheaper grades, sold as liquid driers or brown japans, rosin oil is used in place of part of the linseed oil,

and substitute turpentine, if not all benzine as the thinning medium. It stands to reason that oil driers will give better wear on exterior surfaces than the japan driers that contain appreciable quantities of rosin or rosin oil, and that the former will permit the linseed oil and lead paint to remain elastic longer and remain tougher than the latter. Five per cent. by volume of the oil contained in the paint will be sufficient in warm weather and ten per cent. should be the maximum in cold weather. Of course, it depends very much upon the strength of the oil driers whether these proportions are correct. There is a peculiar feature about oil driers which must not be overlooked. When they are flowed on a slab of glass they usually do not become dry for a long time, sometimes requiring 24 to 36 hours, yet drying paint or oil in the proportions given in from 12 to 18 hours, while the lower priced japan driers will dry rapidly on glass, often in less than one hour, but will powder after 12 hours under the friction of the finger and dry oil or paint only superficially. As to japan oils, the manufacturers do not claim that it is a drier, although this oil requires no additional drier, and the claim is that it may be mixed with raw linseed oil in the proportion of one of the latter to two of the former without further addition of drier. We disclaim any knowledge of the composition of the various brands of japan oil, hence cannot pass any opinion on the article.

—1652—

Manganese as a Drying Medium for Coal-Tar Paints.

There are various forms of manganese salts that are useful as driers, such as borate, sulphate, chloride, oxalate and dioxide, but the last named only is to be considered, because it would be a waste of money to even experiment with the others when the drying salt is to be used in black paint. Whether you should use the oxide of manganese or the resinate of manganese (which latter is simply the oxide fused with rosin) depends upon the facilities you have for introducing either of these drying mediums into your products or material. Disabuse your mind at once of the idea that you can just simply add the powdered oxide of manganese or the powdered resinate of manganese to either the coal-tar or the hydrocarbon oil, that you term asphalt oil, and obtain the results looked for. You will not derive the full benefit of the action of such drying mediums unless you first use them to siccative a drying oil, like linseed, with a sufficient portion of this oxidizing agency. You would have to boil, in a suitable kettle say one hundred pounds of raw linseed oil with five pounds of recovered or precipitated black oxide of manganese, first running the temperature to about 230 deg. F., to expel the moisture, then gradually add the dry powder, stirring frequently until the manganese is well dissolved, and no sediment or crust on sides or bottom of kettle. It will require a temperature of about 420 deg. F. for a few hours to make the siccative oil of good strength. Or you can heat up, say one hundred pounds of linseed oil (previously boiled) to the boiling point, and dissolve in this ten pounds of powdered manganese resinate and produce in this manner a strong drier. Fifty pounds of either of these drying compounds should accelerate the drying of a barrel of coal-tar paint to quite an extent. It must be remembered that manganese salts, no matter how used, are very strong surface driers, causing paint to form films on top, while the body of it may be still very wet, hence for thick paints, in order to make them dry all the way through, lead driers are more to be depended on. For such an oil or siccative, eight pounds litharge, or four pounds red lead and four pounds litharge, to one hundred pounds of oil, boiled as described above for manganese, will produce an excellent drying medium, while a simple addition of the lead salts to the tar would not hasten the drying at all.

Another method to make coal-tar paints dry within reasonable time is to mix one barrel of liquid tar with one barrel benzine asphaltum varnish, adding to the mixture three pounds soda ash or pearl ash, and enough benzine to make the paint flow freely from the barrel.

If the oils you call asphalt oils, are really liquid asphalt hydrocarbons, you

can aid their drying properties by placing the oil in a mixer, adding anywhere from twenty-five to fifty pounds of sifted air-slaked lime for each fifty gallons, agitate it for an hour or two, allow to settle and draw the liquid from the sediment.

—1653—

Quantity of Japan Drier for White Lead Paint.

Wanted to know how much drier will be safe to add to a mixture of 100 pounds pure white lead and $4\frac{1}{2}$ gallons raw linseed oil and one pint of turpentine without deterioration of the wearing quality of the resulting paint.

During late fall, early spring or moderate weather in winter, we should suggest one quart of good oil drier (not gum japan) to the quantity given by you, but when the temperature is between 10 and 60 degrees F. we would suggest three pints of japan or liquid drier containing hard gum, while for the hot season one pint of oil drier is all sufficient, as white lead is a drier in itself, and any overdose will not add durability to the paint.

—1654—

Drier Made with Litharge.

How can drier be made from litharge?

The question was not very specific. Driers are always made by introducing into linseed oil some lead or manganese compounds, or both, with or without gums. The lead compounds may be in the form of litharge, red lead or sugar of lead (lead acetate), but we would not recommend one to attempt to make his own drier, as he can get a perfect liquid drier from a varnish maker or supply house at far less expense and without the risk of fire about house or shop. The manufacturer who makes his purchases on a large scale and has the proper apparatus can do far better on costs.

PAINT AND VARNISH REMOVING.

—1655—

Burning Off Old Paint.

In the event of a fire caused by burning off old paint with a torch, if it could be proved that the master painter had the burning done by incompetent labor the insurance company would try and collect the damages from him.

Therefore be very careful. Examine the work which is to be burnt off, if the house is old and the woodwork decayed, siding turned up, refuse to use the torch. Explain the circumstances to your customer. Scrape the loose paint off and paint over the balance.

Do not burn off in stormy weather, as you cannot judge your flame, and it is almost impossible to get sufficient heat on the surface. Avoid also burning off on the sunny side of the house in warm weather, for the heat makes the men careless. Instruct your men to take it easy and let the torch do the work. Take the torch in one hand, and a broad knife, not too sharp, in the other. It is well for the man to wear a canvas glove on the hand with the knife to protect it from getting scorched, and he can work to much better advantage. Keep the nozzle of the torch an inch or two from the paint—always throw flame downward on siding. Set your broad knife back to flame, not too slanting, and just shove, don't try to cut it off. When the paint is soft enough it will come off easy. Don't push and pull your knife in short strokes, you will get too much old paint on the underside, and it will slip over it all. Let it follow the torch for a stretch of two or three feet. If the torch did not soften some spots and your knife slipped over, just go over that two or three feet again.

If you have moldings, columns, etc, to burn off, instead of a knife use a wire brush and as soon as the paint is soft give one quick forward and backward stroke. To remove the soft paint you can do a nice even job in this manner.

After you have burnt the paint off, sandpaper the work smooth, shellac the knots and prime with lead, three-quarters oil, one-quarter turpentine. If the old paint is cracky and too dry to soften under the heat of the torch it is well to give it a coat of linseed oil the day before you start burning.

John Heiniger, at Ohio Convention, 1908.

—1656—

Paint Burner vs. Paint Remover.

The paint burner is the most expensive method of removing paint, and, in many respects, the most unsatisfactory. The heat softens the wood and the scrapers used in removing the paint are apt to dig gouges into the surface that may not be apparent at first, but that show badly after you paint the work. To make a satisfactory job over burned-off work, you must use a surfacer, just as you would with a carriage that has been burned off. In other words, you must fill up the wood with one or two coats of roughstuff and rub it down with pumice stone to a smooth surface, just as you would a coach body. But people won't pay for that kind of work, and besides that, it needs a good mechanic and one who can be trusted to pay strict attention to his work and not stop to talk to the other workmen. If he lets his thoughts wander and turns round to say something to the man next to him, it's ten chances to one that he will burn a deep scar in the wood that will take a good deal of work and cost a good deal of money to obliterate, if he is fortunate enough not to set the building on fire. When it comes to trying to burn off old paint from weatherboards, it is cheaper to tear off the boards and put new siding on than to pay for the removal of the old paint, either by the torch or a paint remover.

The Veteran Painter.

—1657—

Removal of Old Paint with Alkali.

If there is but one to four coats on the object which is to be painted, and it is sticky, it can be washed thoroughly with a solution of 2 pounds sal soda to a gallon of warm water. Use an old paint brush and lots of elbow grease to apply the soda water. This takes off all dirt, greases and hardens the old paint. Leave the soda water on at least an hour, so it has a chance to eat in, and harden the coats below. After it has stood an hour or more rinse it thoroughly with clean water, sandpaper and give it a good coat of cider vinegar. Coat the work with lead thinned three-quarters turpentine and one-quarter oil. Over this apply your paint as you would over any priming. I have very good results in treating my work in the above manner.

John Heiniger, at Ohio Convention, 1908.

—1658—

Paint Remover.

Seven pounds rosin, 3 pounds caustic soda, 2 pounds soft soap, 3½ gallons crude carbolic acid (30 per cent.), 2¼ gallons water. Make a lye with the soda and half the water, and boil the rosin in the lye, then add the soft soap. Stir well and then pour the mixture into the remainder of the water, and add the carbolic acid and cover until cold.

H. C. Standage.

—1659—

Cleaning After Using Remover.

Extreme care must be exercised in removing the remains of varnish remover after it has removed whatever was desired of it. Carelessness on this score is the cause of the larger proportion of dissatisfaction in after treatment. Benzine of itself is not sufficient to wash up with after using remover—benzine and benzol in equal parts should be used, and when benzol is not available use wood alcohol to clean up with, and follow this with turpentine or benzine.

—1660—

Pinholes After Using Varnish Remover.

One thing for which varnish remover is blamed, and which is chargeable to the operator, is pinholes in the subsequent finish. This is due to the fact that the effectiveness of a remover does not cease with the softening of the varnish, but softens the filler also (in open-grained woods on which paste filler has been used), and notwithstanding he may think he has been sufficiently careful in cleaning off the surface to not disturb the filler, there will be now and then a place where particles on the filler will come out—the inevitable result being pinholes when the surface is refinished. Remedy, do not try to save any of the filler in the wood; take it all out and then refill, rather than blame the remover for causing pinholes and return to the use of steel scraper.

Ohio Convention, 1904.

—1661—

Danger from Some Paint Removers.

A “neutral remover” that contains solvents which are no more inflammable than the solvents ordinarily found in paints and varnishes is obviously neither dangerous nor explosive. A painter does not fear to use naphtha varnish or an alcohol shellac, just because these are inflammable. He takes this fact into

consideration. There is no more danger in using a "neutral remover," which is properly made, than there is in using naphtha varnish. There is, however, much danger in using neutral removers which contain bisulphide of carbon. This is one of the most inflammable liquids that chemists have to deal with. Furthermore, the vapors from it are so poisonous that one-tenth of one per cent. in the atmosphere of even a well ventilated room will cause sickness. It is the use of this substance in some neutral removers which endangers health and property.

—1662—

Varnish Removing on Veneered Work.

Removers containing water cannot be successfully used on veneering or any work in which glue is used to any great extent. Some prefer the use of turpentine and ammonia. This has its virtues, but ammonia is objectionable for light colored woods by reason of its action on the tannic acids, resulting in discoloration of the wood, which increases in intensity as time goes on; the clouded effect on oak doors will be noticeable in the course of three months. The odor is also objectionable to many.

Ohio Convention, 1904.

—1663—

To Remove White Stains from Varnished Table Tops.

Wanted a method for removing the white stains made by whisky or wine from table tops without injury to the varnish.

We have not tried it ourselves, but the steward of a large clubhouse told us a short time since of a simple method, which accomplishes the purpose with little trouble and expense. He takes ordinary sal soda, powders it very fine in the dry state, and sprinkles this powder over the stains, allows it to remain a few minutes, then takes a cloth saturated with kerosene and rubs first the stained spots and finally the whole table top, following with a dry cloth to give polish. We have seen the tables thus treated and believe the method worth trying.

—1664—

Removing Paint Spots and Stains from Stone and Cement Pavements.

Make two solutions as follows:

1. Place one-half pound of lime in a suitable vessel and slake the same with as little water as is required; then add one-half pound of caustic soda (98 per cent.) and one quart of water. Stir a while and let stand to cool.

2. In another vessel slake one pound of quicklime with as little water as is necessary to make it fall into a powder, then add one quart water. Cover the vessel and let stand to cool down.

When the heat is well off, strain both solutions through a paint strainer; then mix the two, stirring well.

Now, boil one-half pound wheat flour in one quart of water to a thick paste, but have no lumps in the same.

While still hot, under constant stirring, in order to prevent lumping, slowly pour the combined solutions, No. 1 and No. 2, into the paste, and when cool you will have a medium stiff paste, which will, when applied to the thickness of one-sixteenth of an inch, remove any oil or varnish paint in from thirty to forty-five minutes from wood, iron, cement or stone. When the paint is removed, the surface should be immediately washed with strong vinegar or acetic acid to destroy any caustic matter. If the wood is somewhat discolored, it may be bleached with a strong solution of oxalic acid in water. Great care must be taken in preparing the material to prevent it from coming in contact with face and hands. Should be applied with trowels, or fiber brushes, or cotton waste swabs, as it will destroy bristle brushes in short order.

—1665—

Is the Use of Oxalic Acid Solution as a Stain Remover Injurious to Subsequent Coats of Paint or Varnish?

The top of a stand had been scraped and sandpapered and after some black spots or stains on it had been treated with oxalic acid to bleach them, washed with water and then dry sandpapered, filled and varnished, yet when the varnish was lightly rubbed, it shoved off from these spots.

We have never known subsequent coats of stain, filler or varnish to be injured or kept from drying properly on spots where oxalic acid solutions have been used, even when the wood was not rinsed with clean water after treating with the solution, provided that enough time was allowed for the surface to dry out thoroughly, and we are inclined to believe that the blackened spots were rather spongy and did not dry sufficiently before the filler and varnish were applied, and that the sealed up moisture caused your varnish to rub off, because it failed to obtain a proper hold on the spots in questions.

—1666—

Removing Paint that Has Been Sanded.

The most effective and surest method will be burning off with the torch, using the scraper. On account of the sand, paint removers will not answer as well as they probably would if only the oil paint was there. Scraping alone is too slow and tedious a process.

—1667—

How Ink Stains May Be Removed from Floors.

After scouring the spots with moistened sand, apply a solution of one pound of oil of vitriol and two quarts of water. If this discolors the wood to any extent, bleach with a saturated solution of oxalic acid. If the ink stains are not too old, an application of a paste made of chloride of lime and water will also remove them. The paste is put over the spots in a fairly thick layer and allowed to remain until nearly dry, when the layer is removed with a knife or spatula, and the spots washed with lukewarm water. Repeat the operation if not successful on first application.

—1668—

Removing Varnish or Floor Paint from Hardwood Floors.

Take caustic soda or concentrated lye and dissolve the same in boiling water, keeping the solution hot while applying it. Have rubber gloves on your hands while you make or use the solution, and apply it with a cotton swab, because it would ruin brushes. Oil paints can be removed in a few minutes and varnish paints or varnishes will yield in from ten to fifteen minutes. When the wood has been cleaned of paint or varnish, it must be well washed with clear water, and if the wood has darkened from the action of the soda or lye solution, and this be objectionable, in case the floor is simply revarnished and not painted, the darkening can be corrected by brushing dilute muriatic acid over it, and when the wood has resumed its natural color, it should be thoroughly washed with clear water and finally with weak soda water to neutralize any traces of acid still remaining. For applying the acid use bristle brushes that are not bound with iron wire. Muriatic acid should not be used, where iron or steel articles are lying about, and in using the soda lye, linen or cotton clothes should be worn, as a single drop of the solution will burn a hole through woolen goods.

—1669—

Removing Cold Water Paint from Brick Walls.

Saturate the paint liberally with a solution of five pounds pearlash (the potash of commerce) in five gallons of soft water, and when the paint has softened use a scraper, then wash with clear water, and give a coating of vinegar, and let the brick dry thoroughly, if oil paint is to be applied. If this will not do the work then use builders' acid, a mixture of equal parts of commercial muriatic (hydrochloric) acid and water by volume and soften the paint by liberal application of this solution. In either case apply the solution with fiber brushes or swabs, made of cotton waste. Make a trial with a small quantity of either of these solutions before going ahead on a large scale, because it depends upon the composition of the cold water paint which will be most effective. Steel brushes, too, may be more effective to remove the softened paint than scrapers, and leave the brick free of scratches.

—1670—

Quantity of Gasoline Required for Burning Off Old Paint.

Please tell me how to estimate the amount of gasoline used to remove old paint from woodwork?

We presume that you mean the quantity of gasoline required in the torch to burn off a certain area of painted surface, as gasoline itself will not resolve dried paint. Your question is a difficult one to answer, as it depends on the kind of torch employed, on the skill of the operator and also on how much gasoline is wasted during intermissions. As near as we can tell, one gallon of gasoline should be sufficient to burn off 600 square feet of paint, that is not too old and dried out, as in that case more care is required.

—1671—

Removing Floor Oil That Has Discolored Base Boards.

Give the base board a thorough scrubbing with soap and water, to which about one-half pint of household ammonia is added to each ordinary bucketful. When all the dirt is removed, rinse and permit to dry. If any of the oil finish still remains on the base boards, remove it with paint and varnish remover or with mixture of 2 parts liquid ammonia and one part turpentine, followed with a wash of benzine. To bleach the blackened portions apply repeatedly a saturated solution of oxalic acid in water. When this has acted and the surface has dried, then rub it over with some turpentine and it will be ready to be refinished by staining, filling and varnishing. Of course, it will be next to impossible to refinish the oak in the natural and have it uniform if the floor oil has penetrated deeply. We would advise you to first try one of those paint and varnish removers you may find in our advertising columns on a small portion of the base board before going to the trouble of doing the work as we have suggested, following directions on the package.

—1672—

Removing Paint from an Old Floor.

Prepare a strong lye by dissolving caustic soda in water and pour this over the floor, spreading it with a fiber brush and let it stand about one hour. Then take equal measures of the lye and hot water and wet the floor again as before. By rubbing this over with the fiber brush, which should have a long handle like a floor brush, a mushy substance of resolved paint and lye will have formed, which should be permitted to remain on the floor several hours longer, until a test will show that all the old paint is resolved. If the old paint still adheres

in places the floor must be flushed over once more with the mixture of lye and hot water. Now the loose paint and lye is taken up by first scrubbing with the fiber brush, dipping it up with a large sponge, which is rinsed out of clear water every time, until the whole floor has been gone over. This done, a mixture of equal portions of muriatic acid and water is applied to the floor with a fiber brush and allowed to remain at least thirty minutes to neutralize the lye in the pores or crevices. After that the floor must be carefully washed with clear water and mopped up in the usual manner. When dry the floor is ready to receive the new coating. The operator should wear rubber gloves or gauntlets and shoes with wooden soles. Nor should he step into another room while cleaning the floor or while wearing this footwear.

—1673—

Removing Paint from Brick or Stone Walls.

As there is no raising the grain or any discoloration from alkalies to be feared on brick or stone, as is the case with wooden surfaces, you can use one of the old-fashioned alkaline paint solvents, which will cost you but little. Dissolve say ten pounds caustic soda or saponified lye in five gallons of water and stir into the solution five quarts mineral oil (the cheapest grade will answer), then add enough sifted sawdust until you have a pasty substance that will hold on a wall without running down. Plaster this thickly on the old paint and in a few hours you can scrape off the resolved substance. Then if you wish to repaint the wall rinse well with clear water and apply a coat of vinegar to neutralize the alkali that may have remained in the pores of bricks or stones.

Or you can slake in one vessel a quantity of builders' lime and in another vessel dissolve a similar quantity, by weight, of soda ash, leaving both stand overnight, mixing the liquor from the soda ash with the slaked lime next day, adding enough whiting to make a paste, applying this to the old paint. In this case it is also necessary to rinse well the wall from which the paint has been removed and give a coat of vinegar before repainting. There are numerous other ways to produce alkaline paint and varnish removers, but those given are least costly.

—1674—

Removing Paint from Iron Surfaces.

If the iron parts are small enough and can be readily removed from their fastenings, the best and cheapest plan is to immerse them in a tub or tank containing enough of a strong solution of caustic soda to cover them and remove them as soon as the paint has dissolved into a tub of clean water, using a scrub brush to remove all of the softened paint, and use sawdust to dry them so as to prevent their rusting quickly. If caustic soda is not available, slake half a peck of quicklime with warm water, and when well shaken add, say, ten gallons of water and let stand over night well covered. In another vessel dissolve ten pounds of soda ash or pearl ash or ordinary sal soda in five gallons of water and mix this solution with the clear liquor taken from the slaked lime. In using these solutions the hands should be protected by rubber gloves or gauntlets, and fiber brushes only should be used. To remove paint from large iron surfaces an alkaline remover in the form of a semi-paste is most economical. The most convenient way to prepare this is to take quicklime, say, six pounds, and slake it so that it will fall to pieces. Then have a solution of two pounds of soda ash or pearl ash in as little water as will dissolve it, add this to the slaked lime with more water until the mass forms a semi-paste, which may be applied to the surface with a fiber brush. This will soften the paint so that it may be easily removed with a stiff brush. If the iron is to be repainted, wash the surface with dilute vinegar.

—1675—

Removing Lacquer from Articles of Leather.

Mix five parts by volume of silicate of soda of 36 per cent. (water glass), one part of 40 per cent. soda lye and one part ammonia of 22 per cent. Apply this liquid to the lacquered leather, using a fiber brush or swab of cotton waste attached to a stick, and as soon as the coating is disturbed wash off with lukewarm water. It will do no harm if by any chance the liquid is allowed to remain until it has dried, because as soon as the surface is sponged with water the old lacquer is readily removed with a scrub brush.

—1676—

Removing Old Shellac or Varnish from Floors.

There is absolutely nothing that we know of that will remove shellac varnish and leave the surface in good condition for refinishing in the natural, excepting the solvents that will dissolve gum shellac in the first place. When it comes to oil floor varnishes there are, of course, removers that are nearly, if not quite, odorless, but here again you have the objectionable feature, that they discolor and roughen the wood. And unless you go to the trouble of cleaning up the floor by the tedious practice of using steel wool you will have to use one or the other of these:—One part pearl ash, three parts lime. Slake the lime with water and add the pearl ash, making the mixture the consistency of paint. Apply with a fiber brush. When varnish is resolved, clean up with water and wash the surface with weak vinegar. Or dissolve two pounds sal soda and four ounces lime in one gallon water. Use as above; let remain about twenty minutes, then clean up surface and wash with vinegar.

—1677—

Bleaching Hard Wood Stained by Exposure.

A very strong bleaching agent is required for this purpose and an oxalic acid solution, even if applied hot and in repetition, is not active enough. After the perished varnish and all traces thereof are removed by thorough sandpapering dissolve metallic zinc strips in hydrochloric acid, about one ounce in one pint of the acid, then add one quart of water and apply to the discolored wood. Repeat the application if required, but always wash off the bleaching agent when it has dried with diluted vinegar or acetic acid.

—1678—

Removing Paint from Plastered Walls.

Paint was applied on plastered walls when the plaster was still fresh and shortly after it began to shrivel and peel off. The best paint and varnish removers were tried with but little success.

We do not understand why paint remover, if applied heavy enough, should not resolve the paint in question, provided it was oil paint. Perhaps an old fashioned resolvent would be most efficient in this case. Slake lime with water, use the resulting paste and thin it with sufficient solution of caustic soda or soda ash to make a thin batter, which apply fairly stout on the wall with a fiber brush. When paint has softened remove with scraper and sponge with clear water. Then wash over the surface with dilute vinegar (equal parts ordinary household vinegar and water) and allow the wall to dry thoroughly. Now you can safely go ahead with the new paint, as the washing with vinegar has neutralized any traces of alkali.

However, if most of the paint has peeled off, why not use steel wire brushes and very coarse sandpaper to remove the rest?

—1679—

Removing Paint and Other Spots from Clothing.

To remove ink spots on cloth without injury, rub on oxalic acid in powder, leave it on for awhile, and then rub off with a moistened sponge. As to removing paint stains from clothing, there are various means, such as benzine, benzole, soapine, etc., while fresh, but when the stains are hard and dry, chloroform or ether are the only means to remove them without injury to the cloth. These are rather costly these days and the remedy may be far in excess to the value of the cloth.

—1680—

Savogran; What Is It?

Savogran is an alkaline material for cleaning off painted surfaces, much used in New England and made by a Boston manufacturer.

—1681—

Old Process Paint Remover, Alkaline.

Dissolve 40 pounds caustic soda, 98 per cent., in 5 gallons of water. Take 8 pounds fine whiting and 4 pounds corn starch and mix with one gallon of the caustic solution to form a paste, which apply with an old brush and leave on the paint for about 20 to 30 minutes. When the paint has softened, wash off with water, using a scraper where required. Will also remove varnish.

Another formula is as follows:—Mix 7 pounds of caustic soda, 98 per cent. with 15 pounds warm water. Mix one pound corn starch and one pound china clay with one and one-half gallon of water, adding it to the caustic soda solution, forming a paste that must be beaten until free of lumps. Apply freely to the surface with an old brush and permit it to remain until the paint or varnish has lifted, then scrape and wash off with warm water. Wall paper can also be removed in this manner, when the remover is further diluted with water. For cleaning painted surfaces, use a weak solution of the remover.

Operators whose hands are easily affected by strong lye or soda solutions should wear rubber gloves while working with the remover. In order to neutralize the alkaline nature of the remover a small portion of vinegar can be added to the water used for cleaning off say one gill to each gallon of water.

—1682—

Removing Spots of Oil Paint from Sandstone.

Wash the spots over with a brush saturated with pure turpentine, until they disappear, then apply a coat of pipe clay (kaolin) in water; allow this to dry and then scrub the surface with a fiber brush dipped in a strong solution of soda or concentrated lye, and follow with clear water and sponge. If the spots are not very old a solution of ammonia will answer as well as the treatment with pipe clay and soda solution.

SPECIFICATIONS.

—1683—

Proposed Specification for Painting and Glazing.

The contractor is referred to the general specifications which will form a part of this contract.

Furnish all labor, material and necessary scaffolding for the execution and completion of the contract as per plans, detail drawings and this specification.

Before priming is done the wood must be thoroughly cleaned of mill dust, etc., and all knots or sappy places to be covered with shellac.

All exposed parts of outside frames to be primed at the mill. Sash tracks to be oiled. Outside woodwork shall be primed with pure ocher and oil or lead and oil. All nail holes and other imperfections shall be puttied before applying the second coat. All woodwork to be sandpapered between coats. No interior painting is to be done until the carpenter has at least one story finished and the floor swept broom clean. This contractor is to keep the glass, walls and floors clean of paint spots, and if there is any evidence of inferior material or negligence on the part of any employe, the work will not be accepted. Iron work to receive two coats of paint of tints as directed. Tin work to have the rosin, etc., removed by tinner and then to receive one coat metallic brown and linseed oil and one additional coat on completion of building. Galvanized iron to be washed off with vinegar and then to receive one coat ocher and oil and finished with one coat lead and oil tinted to suit the superintendent, or if finished in white to receive one additional coat.

All open grained woods to be filled with a paste filler, colored if desired. Give four coats of varnish, the filler and varnish to be rubbed down with fine sandpaper and the last coat rubbed with powdered pumice stone and oil and afterward thoroughly cleaned off. If a high polish is desired on woodwork, give an additional coat of varnish and after rubbing with pumice stone, rub to a high polish with rotten stone and water. If a dull finish is desired without the expense of rubbing with pumice stone as above specified, omit one coat varnish and finish with three coats, the last coat to be a flat varnish.

Close grained woods to be finished same as above, omitting the paste filler, and if a gloss finish is desired, omit one coat varnish and the rubbing with pumice stone. Very satisfactory results are produced by one coat liquid filler and two coats of varnish.

Woodwork in basement and laundry to receive one coat priming and two coats lead and oil in tints as directed.

If sanding is desired on wood or galvanized iron, sand two last coats.

Wherever exposed, woodwork must be finished with an extra varnish.

Shingles to be dipped three-fourths of their length in creosote before placing on the surface of the wall, and to receive an additional coat after placing or dipped in oil and afterward given two coats paint of tints as selected.

No finishing hardware to be applied until the entire completion of the woodwork.

Enamel finish on poplar or white pine:—

First and Second Coats.—Strictly pure carbonate of lead reduced with pure raw linseed oil and a small quantity of turpentine drier.

Third Coat.—Three-fourths lead and one-fourth green seal zinc, reduced with half oil and half turpentine.

Fourth Coat.—One-half lead and one-half green seal zinc, reduced with pure turpentine.

Fifth Coat.—Three-fourths zinc and one-fourth lead, reduced with pure turpentine.

Sixth and Seventh Coats.—Pure green seal zinc thinned in white varnish, the zinc being used to prevent discoloration by the varnish.

Rub thoroughly between coats with fine sandpaper and last coat to be rubbed to a cabinet finish with pumice stone and water. If high polish is desired, specify after the pumice stone. Rub to a high polish with rotten stone and

water. Allow from three to four days between coats. To insure satisfactory results, it is necessary that the parts of the building being enameled should be closed to all except those employed on this work. Mantels, etc., should be in place and the floor scrubbed.

If woodwork is sappy apply one coat white shellac. If old woodwork is to be enameled, sandpaper well, then one coat shellac and finish as above, omitting one coat lead and oil.

Treads and risers to receive two coats boiled linseed oil.

New woodwork to be grained. Prime with yellow ocher and oil, follow with two coats lead, reduced with linseed oil, turpentine and a little drier and the necessary coloring matter, graining to suit. Finish with one coat varnish. Use as little oil as possible in the preparation of the second and third coats, and for the top or finishing coat over the graining, an elastic varnish is advisable.

Floors.—Open grained woods are to receive one coat of paste filler and two coats elastic floor varnish. Rub to a dull even finish with pumice stone and oil. For a wax finish, fill as above, then wax to a smooth even surface with a weighted brush.

Glazing.—The windows in the first and second stories to be glazed with American polished plate glass, glazing quality. Those on entrance doors to be beveled 2 inches on the outside only. Windows in basement, attic, interior doors, transoms and china closet to be glazed with double strength American glass, quantity A. The transoms over stair landing window and front entrance to be glazed with an approved design of art glass costing no less than \$3 per square foot. The glass in toilet and bath room windows to be maze glass. Furnish and set polish plate mirrors with a 1½ inch bevel in bath room cabinet and in mantel in dining room. All lights to be securely sprigged, puttied and back puttied. All putty used for glazing to consist of gilder's whiting and pure raw linseed oil.

John Theobald, at Ohio Convention, 1907.

—1684—

Specification Submitted by N. H. Porter.

Exterior Work.—All woodwork to be thoroughly dry before any paint is applied. No painting to be done when it is raining, nor until the dew or moisture has completely disappeared.

The painter is to see that carpenters have removed all staging, cleats, nails, etc., before starting his work. After priming coat has become thoroughly dry, shellac all knots and sappy places with pure grain alcohol orange shellac.

Before applying second coat, sandpaper all rough places, putty up all nail holes and other defects, with a pure linseed oil putty made from good whiting and white lead.

After the second coat has become perfectly hard and all other mechanics have finished their work, the third or last coat is to be applied.

(Note.—At least two weeks should elapse between second and third coats, and the last two coats are to be rimmed, if necessary, to secure a good job.)

Shingles.—Shingles are to be dipped two-thirds their length before being laid, and given brush coats of some good stain after being laid.

Paint ridge-rolls, valleys and gutters with good coat of ironclad or graphite paint.

Interior Work.—Painter is to see that all woodwork is thoroughly dressed by carpenters before any finish is applied.

All quarter-sawed oak is to be stained, filled and given a thin coat of pure grain alcohol shellac. Putty up all nail holes and defects with white lead putty, shaded to match wood. Sandpaper carefully, then apply three good coats of some reliable rubbing varnish, then rub last coat with pumice stone and oil.

At least a week should elapse between each coat of varnish.

Mahogany finish to be given a deep mahogany stain, and finished as specified for quarter-sawed oak.

Plain or straight grained oak, finished same as quartered, except the stain may be omitted.

Norway or Southern pine to be given one coat of white shellac, nail holes puttied with white lead putty a shade or two darker than the wood, and given two good coats of elastic varnish.

White Finish.—See that the wood is thoroughly dry and shrunk before any finish is applied. Prime the woodwork with lead mixed one-third turpentine and two-thirds oil, with the addition of a little drier.

Putty all nail holes and defects with white lead putty. In about six to eight days sandpaper carefully and second coat with white lead, mixed one-third oil and two-thirds turpentine with a little drier.

In three to four days, third coat with white lead and zinc thinned with turpentine and a little good varnish as binder.

Fourth Coat.—Flat zinc.

Then give two coats of good white enamel, allowing at least a week between coats. After this has stood two or three weeks, and is perfectly dry, rub with pumice stone and water to a smooth, dull finish.

Glazing.—All glass to be imbedded, tacked and puttied into sash.

Ohio Convention, 1907.

—1685—

Unsatisfactory Paint Specifications for Interior Woodwork

Herewith copy of specifications that have been followed to the letter, but the work has not turned out satisfactory. It is yellow and mottled, especially in angles, mitres, etc. Specifications read:

"Whitewood to have three coats of flat white, then one coat of white lead and 'Blank's' Varnish, in the proportion of one-half each, sandpaper and then put on final coat of lead, zinc and varnish, as above mentioned in proportion of 75 per cent. varnish and the other 25 per cent. in equal parts of white lead and zinc. Rub the final coat with pumice and oil to half gloss finish. Care must be taken to clear the lead of all the oil possible when used with the varnish."

Do you consider this a practical specification? Do you think it practical to rub this work with oil or should it be rubbed with water? What, in your opinion, causes the yellow effect? Think linseed oil was used in the rubbing. Would better results be obtained if olive oil were used?

We do not consider the specifications above criticism for several reasons. In the first place, three coats of flat white is rather vague. It should specify positively whether flat white lead or zinc or a combination of both. Nor should all of the three coats comprising the groundwork be flat. The first or priming coat should not be held as flat as the third coat. In other words, the ground should be built up, as it were, permitting the priming coat to enter the wood to some extent. Whether the next coat of equal parts of white lead and varnish is the proper material we are not prepared to say, because we are not acquainted with the nature of the varnish you mention. However, taking for granted that the varnish is a pale one and quick enough in drying to sandpaper well, it would be far better that the specification should call for white lead ground in damar or other pale varnish than to depend upon the oil being drawn from the white lead before mixing with the varnish. The same applies to the final coat of lead, zinc and varnish, as it is very difficult to draw oil from zinc, more so than drawing it from lead. Both lead and zinc should be ground in damar varnish or a very pale rubbing varnish for this purpose, and if the finish is to remain clear white and not yellow off in absence of strong light, the final coat should not contain lead at all, but French process zinc of best grade only. The yellow cast is, without doubt, due to the use of lead in the gloss coats, especially in the finishing coat and the mottling may be due to the oil retained in the lead, which may not have mixed well with the varnish, or it may be due to rubbing the surface with oil before it was hard enough. Had it been rubbed with pumice and water it might not have mottled, even if not hard enough. Still, oil rubbing produces a more velvety semi-gloss effect than rubbing with water, but the oil and pumice must be carefully removed. Olive oil is a better lubricant for rubbing than linseed oil, but many finishers prefer crude petroleum to either. When the rubbing is done the oil must be carefully cleaned off, which is best done with a soft woolen rag, moistened with weak alcohol or turpentine.

MISCELLANEOUS.

—1686—

Determining the Presence of Water in Liquid Paint.

The following questions were asked:—

What is the best method of determining the presence of water in ready-mixed oil paint? By this was meant water mixed in as a saponifier. Could you give a formula for a good water saponifier for this purpose? Also what would be a safe quantity to use to a gallon of liquid oil paint and what are the results on the paint, both in the can and after application?

The surest way to determine the presence of water in paint and its quantity is to submit it to an expert paint chemist for analysis. Other tests are often misleading, especially when the oil and water emulsion is perfect. However, the mere presence of water may be determined by permitting the paint to stand undisturbed long enough for the pigment to settle to the bottom of the package and pouring the clean thinners off the top, then taking some of the pasty portion, working it on a slab of glass with a spatula, pressing the latter down firmly, when water, if present, will show up in large drops. Sometimes water will show if the heavy portion of the paint is thoroughly stirred with a stick or paddle by reversing the motions. Water may also be shown by placing the heavy portion of the paint on a porcelain dish, holding the same over a flame, by spluttering, but, as stated above, these tests may be misleading and would not be considered conclusively by authorities. As to mixing water with oil paint, it depends largely on the composition of the pigment as to which is the best saponifier. In a lead and zinc paint, water without any addition of chemicals can be introduced in moderate quantities and will keep the paint in suspension without showing the water. Carbonate of soda, sal soda, bi-borate of soda, potash, etc., are most commonly used for the purpose, but the best solutions are proprietary and not at our command. We will give you a formula that we know to have been used with success:—One pound sal soda, one pound borax, each dissolved separately in five gallons boiling water; mix these and add, while stirring, two gallons raw linseed oil. Let it stand three days, then stir again and use one gallon to every ten gallons of ready-mixed paint, when composed of pure lead and zinc white, but when the paint is composed of mineral red or brown, do not use more than one gallon to every fifteen gallons, unless you wish to make a very inferior grade. In the latter case the pigment will not take up the solution as quickly. The effect on the paint in cans is that it will hold in better suspension than it would without the solution, and that it does not incline to fatting. As to the result after application, the water will evaporate rapidly during the drying of the paint and will not have any bad effect on its wear, unless the dose is too large, when it is liable to leave the paint very porous, with poor gloss and with poor covering capacity.

—1687—

Discoloration of White Striping or Lettering on Certain Reds.

A strip of veneering coated with red and striped in white and blue was received. One-half of the strip is coated with red in oil, the other half is or appears to be finished with a coat of varnish over the stripes. The ground, or first coat, the sender explains, is red lead and whiting paste in oil, thinned with turps and benzine and a little driers. The second coat, a vermilion known as Para red, made into a paste with raw oil and a little varnish, thinned with equal parts driers and benzine. The white striping is done with French zinc, the blue one part ultramarine blue and three parts zinc oil, thinned with turps and very little drier. He desires to know why the white stripes on American vermilion under similar treatment remain pure white.

The group of reds, commonly known under the collective name of Para red, though the fastest of bright reds to strong light, have one bad effect, that of

"bleeding out," unless specially treated. The coloring matter or dyestuff is partly soluble in oil, especially in such volatile oils as turpentine or in petroleum spirits, such as benzine or gasoline. The more coloring matter and the less inert base these reds contain, the more they will bleed out; that is, the more dyestuff they will give up to the oils in which they are ground and with which they are thinned. When only linseed oil and a little drier is present, and the paint permitted to thoroughly harden before striping, the stripes will be but little affected, but when the red is made to dry flat or nearly flat to admit of striping, the turpentine in the striping color will soften the paint underneath the stripe somewhat and draw some of the coloring matter through the stripe, causing discoloration, which becomes more noticeable when varnished over. Even when the Para reds are mixed in all oil, such discoloration may be noticed in white stripes on close examination. In vehicle painting, the red can be ground in a good varnish, thinned with turpentine and applied flat or in eggshell gloss and a coat of rubbing varnish given, which is haired down to permit of striping. When this is resorted to, there will be no discoloration perceptible, even after the finishing varnish has been applied. English, American or artificial vermilion do not have the fault of giving up coloring matter, because English and American vermilion, when pure, do not contain dyestuff and artificial or eosine vermilion do not contain coloring matter that is soluble in oil, turpentine or benzine.

—1688—

Fat Paint and the Causes of Paint Becoming Fatty.

Linseed oil paints may be regarded as being fatty, when they have stood about for quite a long time, exposed to the air, when the oil has become somewhat rancid or oxidized. This state is shown, when the paint skin (linoxin) has been removed, the paint stirred up and applied to a surface in the usual manner and when it then shows a very high gloss and a decided tendency to sag or run. Paint of this character will not become hard, even when apparently set, and will keep soft and is easily pushed off with the touch of the finger, when it seems to be hard. Many old line painters harbor the mistaken idea that fatty paint is the best priming material, but it has been proved in practice time and again that priming with fatty oil paint causes peeling of the surface coats, because these cannot obtain a good hold on fatty primings. Neither will fatty oil paint penetrate into raw wood or brick as it should. The reason for linseed oil paint becoming fatty must be looked for in the action of linseed oil, which, when exposed for a long time to the atmosphere, has the tendency to become rancid and thick, especially when mixed with basic pigments and drying mediums and with certain portions of turpentine and other solvents. The only way to use fatty linseed oil paints successfully is to "cut" them with turpentine or benzine, adding a little drier.

—1689—

Utilizing Old and Fatty Paint and Paint Skins.

A good method for utilizing fatty paint left over from various jobs than to boil them and add soft soap to cut out fattiness was wanted. It was desired to use the material for rough work, such as fences, etc.

For softening paint skins, the method mentioned is the best. The skins may be put in a kettle with enough oil to cover them, and the mass boiled over a slow fire, while being continually stirred with an iron paddle to keep it from scorching on the sides. The same may be done with your remnants of old and fatty paint and it is not necessary to add soft soap. Boil until all is well dissolved and take kettle from fire. When cooled down some, thin the mass with benzine until of stout brushing consistency, then put through a strainer, and place in a handy container for future use. Never use this material, however, as a priming for raw wood, as that would surely result in peeling. Another method is to make

a solution of one pound sal soda in one gallon of water. Cover the old paint with sufficient of this solution, and after stirring the mass, let it stand for a few days. Pour off any water that may be on top by that time, stir in some linseed oil and benzine, until brushing consistency is obtained, then strain and put away for use. Before application, add a little drier.

—1690—

The Term Gangue as Applied to Pigments.

The meaning of the word "gangue," as found in standard works and chemical analytical reports, relating to paint pigments, was desired.

Gangue is the collective name for the earthy matter that occurs in iron and other ores. For instance, red oxide of iron is said to contain 62 per cent. ferric oxide, a certain percentage of clay, silica and lime, then it is proper to say, that the gangue consists of these materials without stating the respective percentages of each. The same applies to copper and other ores.

—1691—

Free Hand Relief Material.

The only good working formula we know of is made as follows:—One pound of plaster of Paris, one-quarter pound dry white lead, powdered, and two teaspoonfuls bicarbonate of soda are intimately mixed with water to a thick paste. This must be immediately filled into the rubber bulb and the design worked out at once. The material may be colored by mixing dry color with the dry plaster of paris before the paste is mixed. The bicarbonate of soda (baking soda) is added for the purpose of keeping the material from setting too quick, and, while the relief figures are still wet, brocades or bronze powders can be sprinkled over it.

—1692—

Irish Moss and Its Uses in Mechanical Pursuits.

Irish moss, as it is popularly known, goes under the botanical name *chondrus crispus*, and is a transparent seaweed of a purplish-white tint. It is used as feed for cattle, and also in preparing jellies and candies. The dried moss, on boiling with water, goes into a gelatinous mass not unlike syrup, and this is used in wall sizes for paperhangers and similar preparations. It has also often been used in paint and varnish removers, in cements, etc., but of late has given way to cheaper adhesives.

—1693—

Origin and Composition of Celluloid.

Celluloid is made by converting paper pulp into introcellulose through immersion in sulphuric and nitric acid, washing to free from acid and grinding together with camphor. It can be molded and turned into any number of useful articles, but burns with great rapidity. Celluloid varnish, according to letters patent No. 450,364, issued to E. N. Todd, Newark, N. J., is pyroxyline, dissolved in amylacetate or a mixture of fusel oil, benzol or benzine and acetic acid. When varnish so prepared is applied to glass and the film permitted to dry and the glass steeped in water for a time, the film can be taken off in a sheet, which has all the appearance of clear celluloid and will burn even more rapidly when coming in contact with flame. The so-called banana oil or banana liquid is a similar mixture, reduced and cheapened with the addition of petroleum benzine. Zapon is a proprietary name for a lacquer made by dissolving celluloid in amylacetate and acetone.

—1694—

Keeping Rugs from Curling Up at Edges.

A number of rugs made from Axminster carpetings were used on waxed floors. Owing to the texture of this fabric the rugs have a tendency to curl up at the edges and to wrinkle. A formula was desired for a size to apply on the under side that will stiffen the carpets without being injurious to the material.

Prepare a size by mixing three parts by weight of starch with five parts by weight of glycerine, first beating up the starch in cold water until all lumps have disappeared; then add the glycerine and water, little by little, until the size is of proper consistency. Apply with a soft sponge. Another size that will be stiffer may be prepared by mixing seven and one-half parts by weight of sulphate calcium (gypsum) and thirteen and one-half parts kaolin (china clay) in sufficient water to make a soft batter, adding three parts by weight of refined glycerine as binder. This should be applied with a soft brush, and when dry it should be brushed smooth with a stiff brush.

—1695—

How Mercury May Be Purified.

To clean mercury which has been contaminated by particles of white lead:—

Place the mercury into a deep glass tube or jar and put dilute sulphuric acid over it (dilute nitric acid will also answer), then introduce a piece of copper, which must be of sufficient weight to make a good contact. The local action will dissolve all impurities, but it must not be continued too long or sulphate of mercury will form. The white lead will go in solution with the dilute acid, which can be poured off and leave the mercury clean. Use clear water freely to remove the acid. It is hardly necessary to caution you to be very careful in handling the acid.

—1696—

Treating Sheets of Aluminum So That They Can Be Written Upon with Lead Pencil.

What treatment is required to oxidize or corrode thin sheets of aluminum metal, so that one side may be written on with ordinary lead pencil? A solution of copper sulphate, hydrochloric acid, acetic acid, had been used, but without result. These metallic sheets were to be used as labels.

Dilute aqua regia, that is a mixture of one part nitric acid, three parts hydrochloric acid and 10 parts water is the only acid solution that will attack and roughen the surface of the metal, but the process is slow and expensive and leaves undesirable marks on the surface. Make a strong solution of caustic potash (KOH) in water, put it in a shallow pan, cut your sheets into convenient strips, immerse them in the solution, and in from two to five minutes you will have a bright film on which your lead pencil will make a mark that cannot be effaced by repeated washings and will stand out clear and plain. Not only that, but the aluminum will look very bright and clear after rinsing it in clear water when removing it from the solution.

—1697—

To Make Hectograph Pads.

Hectograph mass that will not turn rancid is made by soaking 4 ounces of gelatine or best white glue in 15 fluid ounces of lukewarm water, until the mass is thoroughly softened. This will take place over night. Then heat the mass

in a waterbath, stirring in slowly 15 fluid ounces of refined glycerine, maintaining the heat until most of the water has evaporated. Now remove the mass from the bath and carefully stir in one-half fluid ounce refined carbolic acid, before the mass sets by cooling and pour the mass into the form, which may be made of wood or tin to the proper size. The form or frame should be so shallow that the mass stands out above the edge at least one thirty-second of an inch. Set it on the level in a cool place for a day at least before using. Before taking the first copy, go over the face of the mass lightly with a wet sponge and let it nearly dry. If this precaution is neglected, the hectograph will be ruined because of the liability of the paper sticking to it. For ink, dissolve one ounce of aniline blue (2RB or 3B) in 7 ounces of hot water and add on cooling one ounce grain alcohol with one-quarter ounce glycerine and a few drops carbolic acid. For black ink, dissolve nigrosine black one ounce in fourteen ounces hot water, adding four ounces glycerine and two ounces sugar.

The writing or drawing should be done with a good new steel pen with either of the inks just described, and when the writing or drawing is dry, the copy is placed face down on the hectograph and rubbed gently on the back to insure perfect contact of every part. After remaining a minute or so remove the first copy (or original) and proceed to take copies by placing the paper on the hectograph, gently pressing and removing each by beginning at the lower left-hand corner. When it is desired to make new copies, the ink may be removed by washing the mass over with a sponge wet with cold water and letting it dry before using again. If the hectograph is not used for several days, washing is not required, as the gelatine will have absorbed the ink.

—1698—

Pasting Photographs in Glass Paper Weights.

The best method for pasting photographs in glass paper weights was desired.

We would advise the following:—Take four ounces of best white gelatine and soak for about thirty minutes in cold water; then place it in a glass jar and add sixteen ounces of water; put the jar in a large dish of hot water, which will dissolve the gelatine. When the latter is dissolved put the solution in a shallow tray, have your prints on a roller, albumen side out,, take the print by the corners and pass rapidly through the solution, taking good care to avoid air bubbles. Hang the prints up with clips to dry, and when they are dry squeeze them carefully into the backs of paper weights. The glass must be without blemish to give a good effect.

—1699—

Emery Sticks for Sharpening Knives.

An inquirer desired to know how to make emery stick to wood. He wanted to make a stick for sharpening knives used in kitchens. Had tried every means that he knew of to make emery hold on sticks of Oregon pine, filling same with good wood filler and then coating with first-class varnish on which to hold the emery, also used Le Paige's glue, but neither method had proved satisfactory.

You will most likely succeed, if you follow these directions:—Have the sticks made of well-seasoned wood, place your emery on an iron plate that is heated to not less than 200 degrees F., nor over 212 degrees F. Have some good animal glue melted to the consistency used for joining wood, dip the sticks into this, let it drain some, then roll into the warm emery. When the glue has dried, brush off the surplus emery, when the sticks may be dipped once more in the hot glue and again rolled in the warm emery. By using emery of different size mesh, you can prepare sticks for various purposes for finer or coarser work.

—1700—

When Should Shellac Be Used?

Is it good to shellac between priming and first coat, or is it better to shellac pine or cypress first?

In my opinion shellac wants to go right next to the wood, wherever wood is to be painted. I have no faith in shellacing between coats. After priming it would be very easy to omit some places where the sap may afterward show through, but if you shellac first and coat the whole surface, as you ought to do in a first-class job of interior painting, you will hit everything. Beside that, the shellac makes a good hard surface to work upon. It is a funny thing about shellac. You can shellac the entire surface of a board and paint over it and you don't see anything of it afterward. But if you shellac the knots on the exterior of a building they will often show through, especially where there are not many coats of paint. This may be due to the quality of the shellac that is used. On a plastered wall that is to be painted, if the cracks that are cut out and pointed up are shellaced before painting they will almost invariably come through, and it will take a good many coats of paint to cover them up. It is a much better way to bring up the cracks with paint until the entire wall has a uniform suction. I suppose the reason is that the shellac entirely prevents suction over the cracks, whereas the rest of the wall has a certain degree of suction.

The Veteran Painter.

—1701—

How to Break the Apparent Tall Appearance of a Building by Painting.

What combination of colors would be advisable for a house on the foot of a mountain that is about twenty-six feet up to the roof and has a slanting slate roof of twenty-five feet pitch, looking from a distance like a smoke-stack?

In selecting a combination of colors for such a building we would first consider the surroundings, and if there is no foliage about, we would select a dark body color, like green stone, with trimmings of bronze or bottle green, red ash and moss green for shutters. If there are trees or foliage about the place, we should select for the body a light tan color, for the trimmings a rather dark tan, white for sash and a dark bronze or bottle green for the shutters.

To reduce the tall appearance of any building, place heavy colors on top; to make small buildings appear tall, place the dark colors at the base.

—1702—

Preparing Quick Drying Flake White for Striping.

To make flake white flow freely from the striping pencil, mix a few drops of a good, pale rubbing varnish with your flake white as it comes from the tube or can, and should it be very stiff thin with a few drops of turps before adding the varnish.

—1703—

Remedy for Clouded Effect of Stain and Varnish.

To remove a cloudy and uneven effect on old furniture that has been cleaned off, stained and varnished, take powdered pumice and water, and with a piece of felt rub down the varnish until it becomes dead flat, then rinse with sponge and clear water and dry with chamois skin. Now glaze the furniture in oil or water and use the mottler to have the glaze good and uniform, and when thoroughly dry apply your varnish, but not before you have tried it on a small piece. Your stain probably dried too rapidly in the first place, therefore the clouded effect.

—1704—

Madder Lakes and Alizarine Lakes.

The madder plant, which was extensively cultivated in Greece, Holland and the south of France up to 25 years ago, and from whose glucosides the coloring matter of madder lake was derived, has given way to the coloring matter artificially manufactured from the anthracene of coal tar, the chief coloring matter, alizarine and purpurin, being present in both the madder plant and in coal tar. Without going into the details of their manufacture, we can safely say, on the basis of tests made by reliable parties, extending upwards of ten years, that alizarine lake, well made, is superior in point of brilliancy and permanency to true madder lake, especially when used as an oil color, or when protected by varnish. We know of several cases where alizarine red lake has stood exposure to strong light for nearly 10 years without any other change than that brought about by the bleaching of the oil. Though not originally as brilliant as French carmine, it will outlast the latter four to one in point of stability of color.

—1705—

Filling in of Cracks in Plastered Walls.

Trouble occurred in repainting an old plastered wall, the filled-in cracks showing much darker than the rest of the surface. From the statement of the painter it appeared that he had simply cut out the cracks and filled them with a plaster of paris putty without, however, taking the precaution to stop the suction in the new plaster, with which the cracks were filled. While it is perfectly proper to fill in cut-out cracks in old walls with plaster, which is mixed with a thin glue size, the plaster should, as soon as it becomes hard, be coated with white shellac varnish, or better still, fill in the shrinkage with hard glazier's putty (previously mixed with some dry lead and a trifle of good japan). This dry, sandpaper down to the level of the wall and coat the putty with paint of the color that is on the wall. Should one coat dry too flat, give another, and if necessary, still another, until the filled-in portions match the old effect. When this is done there will be no absorption and consequently the old cracks will not show through after repainting. We do not think that the cause of the trouble was either in the plaster or in the paint, for in that case defects should have been found on the rest of the surface.

—1706—

Oak Graining Over White Paint.

In the case of some oak graining over white paint the graining color and varnish scaled off. It was required to do the work over, without going to the expense of burning off, and yet avoid the same trouble of scaling off to the ground coat.

What is wanted is to know how to get the whole thing off, new varnish and graining coat and the old paint, in the quickest and cheapest way other than burning off. In other words, what is required is a good cheap formula for a paint remover. Well, there are a good many—some of them are good and some not so good. We will give you some good ones. They are, any and all of them, very easily made and will cost you but a very few pennies per pound to make.

Take of pure caustic soda, that would be 98 per cent. goods, a pound. Dissolve that in two pounds of warm water. The warmer the water the quicker it will dissolve. While this is dissolving, mix in another receptacle two ounces of common starch, preferably corn starch, and two ounces of china clay with two pounds of cold water. Add the water a little at a time, not all at once.

When the soda solution gets cold mix the two together, and stir till they come to a smooth paste.

Apply this to the paint surface to be removed, spread it on rather thick; that is, smear the surface well over with the paste. Let it remain a few minutes, till it has done its work. You can easily see by a trifling examination when the paint is well loosened. Then it can all be removed with a scraper, putty-knife or an old brush. Clean off to the wood, and after you have scraped it well to get all the paste out, it will be best to wash it off with clean water. If there is still any evidence of the paste left (this will be shown by the soapy taste or feel to the fingers) it will be best to wash the surface in weak vinegar. Simply take a little vinegar and water, and with a cloth wash over the surface and dry it. This is not likely to be necessary, if you have properly handled the paste.

Another remover is made by making a strong caustic soda solution, as in the previous case. Mix this to a brushing paste with terra-alba, or for that matter whiting will do as well. Spread this over the surface to be removed and let it dry there. Then wash off with hot water. Still another is made in this way: Dissolve eight pounds of caustic soda in five gallons of water. Best to use hot water, as stated in the above. Take ten pounds of whiting and make it into a very stiff paste with cold water, add to this about four gallons of the caustic soda solution. Mix in another receptacle two and a half pounds of potato starch with a little water, just enough to make a paste of it. Add this to the other and mix well. Don't add hot water to the starch. Use cold water only. After this is mixed it is made much better by running through a paint mill. You will find this makes a good remover.

To make a liquid remover, take a quart of the caustic soda solution in the formula just given and add to it four gallons of water. That will take off almost anything.

Another liquid remover is made by taking three pounds of concentrated lye (potash) and dissolving it in twelve pounds of water and adding to this two pounds of acetate (gray) of lime. Boil these gently and let settle and pour off the clear supernatant liquor.

Any of those given will answer the purpose for which they are intended. When your old paint, etc., is off, go to work building up the ground coat for graining. Keep your ground flat and you will have no trouble. It is very likely that the trouble in the old job was due to the graining being put on over old paint, which might have been a little greasy, as is usually the case with old paint on the inside of a house. It may not have seemed greasy, but it might have been so nevertheless, and if the graining color was water ground, which is very likely to have been the case, you at once see where all that trouble came from. The graining color dried on that surface which was very slightly oily or greasy. Then came the varnish coat, which pulled the distemper coat off the ground—rather, off the oily or greasy surface.

—1707—

Removing Dust, Dirt and Smoke from Painted Ceilings and Walls.

Make very liberal use of dust brush, sponge, brush, soap and water and last, but not least, elbow-grease.

—1708—

Removing Paint from Hardwood Furniture.

Try a mixture of two parts of aqua ammonia of 18 deg. and one part spirits of turpentine, which will soften the paint so that it can be removed with the spatula or scraper. However, you must be careful not to dig into the wood, but rather make several applications of the mixture, and finally use a stiff brush to remove the paint from the grain of the wood. The turpentine in the mixture prevents the ammonia from raising the wood fibre. When every particle of paint is removed, wash the surface once more with clear turps and allow to dry thoroughly before attempting the usual finishing process.

—1709—

Testing the Purity of Gold Leaf.

Put a few drops of nitric acid upon a piece of glass and place thereon a small piece of the leaf. Pure gold leaf will not be affected by the acid, while other metals that may be mixed with it will go into solution. A small percentage of copper is usually present in the best gold leaf, not as an adulterant, but in order to make it more workable.

—1710—

Effect of Freezing on Fresh Oil Paint.

As linseed oil does not actually freeze unless the temperature is less than 18 deg. F. below zero, and as exterior house painting is not carried on in such frigid weather, there can be no actual injury to paint in freezing weather, excepting that the drying of the fresh paint is retarded. As a matter of course, another coat of paint should not be applied until the previous one is thoroughly dry, which, under the conditions named, may require weeks to become hard enough. A moderate use of turps will accelerate the drying and hardening of the paint in winter weather, and 75 per cent. boiled linseed oil and 25 per cent. turps is the proper proportion for the under coats, while for the finishing coat the turps should be cut down to from 10 to 15 per cent. Another safeguard is to hold the paint medium thin and brush it out to the utmost.

—1711—

Cheap Binder for Distemper Painting.

Dissolve in the usual manner one-half pound white sheet glue in one gallon of water, to which add one-half pound crystal alum previously dissolved in hot water and one-half pound white ivory soap that has been cut into thin strips and also dissolved in hot water. Mix all and boil until it becomes a thin, syrup-like mass that is perfectly free from lumps.

—1712—

Cement or Putty for Aquariums.

The simplest recipe that we know of is to mix fine litharge with refined glycerine to the consistency of soft putty. This becomes as hard as stone and will not crumble.

Another good cement is made by mixing waterglass 33 deg. with zinc white or paris white.

—1713—

Cleaning Painted Surfaces.

An excellent thing to advise as being most effective and least injurious to the paint, is soft water, good soap, soft brushes and cloth for doors, sills, etc., and water with a trifle of aqua ammonia for floors. Never suggest anything stronger, especially where you do the painting. Many housewives or their servants have a mania for cleaning, that goes to extremes in the selection of mediums. Soft soap containing strong alkalies, soap powders, overdoses of ammonia, the use of sand soap, or even fine sand, coarse, hard scrubbing brushes and coarse wiping cloth are used with an energy worthy of a better cause, and then they wonder why paint does not stand or wear on floors and on doors, window frames and sash. The moderate use of soap or dilute ammonia, which is generally rinsed off again in short order, does no harm to the paint. It is the mechanical friction of the brush, the coarseness of the cloth and the strong alkaline nature of the soap powders which does the harm.

—1714—

Treating Kalsomined Walls for Papering.

If the kalsomine is in good condition, hard and sound, an ordinary glue size is all that is needed; give the walls a good coating and proceed. If the kalsomine is old, disposed to crack or crumble, or, in other words, if it is not absolutely sound and in excellent condition, the thing to do, if you can't take it off, is to give the walls a soaking coat of good, strong size; further than that, be sure that the rooms and the walls are warm; warm enough so that the size can and will strike clear through kalsomine and attach to the solid wall itself. That will make you safe. If, on the other hand, the walls are cold, they will chill the size before it gets into the wall and cause it to jell. Then when your paper goes on it looks very well at first, but soon the paper, size and part of the kalsomine come off, and stretch themselves out upon the floor, as provokingly as gnats in varnish. Another point that should always be kept in mind is that this size should never be put on in any other condition than hot, or good and warm.

Your paste will likely hold better if you add a little Venice turpentine to each bucketful, say about an ounce of it dissolved in a little hot water, and then well stirred into the paste.

The very best and safest way to paper over kalsomine is to take the kalsomine off the walls first; it is the only way to do it and do it well, but we know that many times a man is not allowed to remove the kalsomine, when the price paid is considered.

—1715—

Killing Knots in Outdoor Work.

In this country shellac varnish is generally employed for the purpose, and sometimes red lead is mixed with the shellac varnish. Thin glue size and red lead are also used, but wherever the sun has a good opportunity to get its work in the knots will show through and discolor tints in short season. The very best method is to apply oil size to the knots and lay the leaf of silver or aluminum metal over it. Unless the knot be very pitchy or sappy this will prevent exudation.

—1716—

To Avoid Varnish Cracking in Graining.

The cracking of the varnish on outside grained doors may be due to inelastic varnish or to a ground that is too oily, or to the varnish being applied before the ground work and graining color is dry. Have your ground thoroughly dry, and do not hold your graining color too oily and give it ample time to harden before varnishing; then finish with a good elastic outdoor varnish and cracking will not occur, if the lumber be fairly well seasoned.

—1717—

Use of Boiled Oil.

We do not especially advocate the use of boiled oil, but do believe that for slow drying pigments it is far better to use a pure kettle-boiled linseed oil than to use raw oil and dose it heavily with cheap japan driers. It is a serious error to lay the reason for paint blistering to boiled oil, because blistering is invariably brought home to moisture, and in kettle-boiled oil all moisture has been expelled. Of course the so-called bunghole boiled oil (a mixture of raw oil and cheap drier) may contain large portions of water. Gold size, which is really boiled oil, heavily charged with red lead and litharge, should not be added to oil colors that are good driers in themselves.

—1718—

Greens for Distemper Painting.

The Brunswick green in distemper, which is acted on by alum, or caustic lime, is not the Brunswick green of years ago, which was a basic chloride of copper, now quite obsolete. It is known in the United States as commercial chrome green, a mixture of Prussian blue and chrome yellow on a mineral base, mostly barytes, usually 20 to 25 per cent. color, balance barytes. These greens hold their color very well as an oil paint, but as a water color are very easily attacked by lime and other caustics. Sometimes the blue will change first, but mostly the yellow turns to orange and gives a decidedly smutty olive cast to the color. We should advise for use in distemper painting, when the price paid for the work will permit the advance in cost, such as verdigris and emerald green, or, if their poisonous character prevents their use, green verditer, Bremen green, cobalt green and terra verte (or Verona green), all of which are lime or alkali proof.

—1719—

Preventing Bronze from Tarnishing.

Any bronze stripe, letter, etc., may be kept from tarnishing by coating it over with a thin coat of white shellac varnish, before it is coated with finishing varnish.

—1720—

Sizing Muslin for Lettering.

For ordinary signs, not exposed to the weather, use a thin size of glue and water. For outdoor purposes melt two ounces of white beeswax, and after removing it from fire, thin with one quart of turpentine. Apply with a brush while warm.

—1721—

Filling in Letters on Metal Signs.

If black, make a putty-like mass of asphaltum, brown japan and dry lamp-black and fill the spaces. Clean the edges with turpentine and when the cement is dry polish the sign. For white letters make a putty of dry white lead with equal parts of coach japan and rubbing varnish and fill up the letters to nearly the level of the surface. When this is hard, apply a stout coat of flake white in japan, thinned with turps, which will give a clean white finish and may be polished. This may be tinted to any desired shade. In any case, the cavities of the letters must be thoroughly cleaned before filling in to insure adhesion of the

—1722—

Painting on Ground Glass.

Rub over the ground side of the glass with equal parts of oil and turpentine, then dip some cotton into turpentine or benzine and remove therewith the oil and dry the glass well. Now dust some fine starch on the surface and brush it off with a duster. This removes the dust produced by the grinding of the glass entirely and bleeding out of the colors need not be feared. Do not draw your sketch with lead pencil, because that will always show on the reverse, but use black crayon, because this will be absorbed into the colors. Select tube colors only for this purpose, and to make them flow properly add a little fat farnish and thin with turpentine for first and second coats. The larger paintings should have three or four coats, and should be stippled after every application. Should any part of the painting dry out flat, coat it with a good, pale coach varnish. Painting done by this method will prove very durable.

—1723—

Making Use of Paint Skins for Roof Paint.

We do not know of any better method to make use of paint skins than to soften them by boiling with plenty of linseed oil or linseed oil foots, running the softened skins through a paint mill or a paint strainer, and we believe such paint to be cheap, even at a high cost of linseed oil. We do not advocate the use of substitutes or inferior oils, nor would we recommend the boiling of paint skins with anything but linseed oil, but if the paint must be cheap and if low cost is paramount to durability, there are mineral oils and rosin oils offered to the trade which may be employed for thinning the boiled skins to painting consistency and the material cheapened by these means. Many dissolve the paint skins accumulating about their workshops in a solution of 2 lbs. concentrated lye, 5 lbs. unslaked lime and 15 gallons of water. The skins are occasionally stirred and when dissolved the lyewater is poured off from the top and the paint in bottom of tank or barrel may be used, after thinning, for priming rough work, but is hardly fitted for coating tin roofs or ironwork.

—1724—

To Fix Bronze Colors on Glass.

The late Prof. R. Bottger, of Frankfort-on-the-Main, employed a process for fixing bronze colors on glass, etc., which consists in using differently colored fine bronze powder, together with a concentrated potash water glass solution of 30 deg. B. After the articles to be bronzed have been very thinly and uniformly coated with the water glass solution by the use of a fine brush the bronze powder is strewn on by means of a sort of sieve. Allow same to dry perfectly with ordinary heating, and remove with a broad, fine brush the superfluous bronze powder which has not been taken up by the potash water glass. The water glass effects such an intimate combination and adhesion of the bronze powder layer to the object, that even alcohol, sulphuric ether or water are not capable of removing the same. Such articles may even be polished with a burnisher or agate. Glass as well as porcelain, metals of every description; wood, such as mirror and picture frames, etc., can be decorated in this manner and the covering may be washed off without injury.

—1725—

Varnish Becoming Chilled in Cold Weather.

When varnish has become chilled, it will show a soiled or sandy surface. When varnish or japan is received in freezing weather, it should be placed and left undisturbed for a few days in a very warm place (at least 75 degs. F.) before an attempt to use it is made, and if stored in a room with a temperature lower than 70 deg. F., it should be placed in a place that is warmer than 75 deg. F., for a few hours. A thermometer in a room may register from 65 to 70 deg. F., yet if this thermometer was placed close to the floor it might register 10 deg. less.

—1726—

Paint That Will Not Peel Off.

Peeling or scaling of paint is usually due to the use of improper material for priming, and no subsequent attempt at remedying the evil will be successful, unless the proper priming is applied, after all the loose scales have been removed. Paints consisting of pigments of a brittle nature and inferior oil must be carefully avoided and the priming must consist of a pigment and vehicle that have great affinity for one another. No matter what subsequent coats may

consist of, the priming coat should be pure white lead and raw linseed oil. In repainting such a job proceed in the following manner:—First, scrape off all the paint, loose or otherwise, and if impossible to remove all by scraping, but the obstinate part off in the usual way, then give a thin priming, using not over eight pounds of strictly pure white lead to one gallon of pure raw linseed oil, and about one-fourth pint of good liquid drier. If convenient, tint this primer with a little lampblack and work the priming well into the wood. Allow this priming to dry thoroughly for a week, if possible, then give a heavier coat of white lead, oil and drier, tinted to match finish desired, and when this has dried well, finish with whatever paint is required. Two coats over such priming should always be given. This method may be more expensive than those usually followed, but good results can be vouchsafed.

—1727—

Painting Plastered Walls.

In Government work contractors are generally held down strictly to specifications, which fact should not be lost sight of. It would be cheaper to give one coat of glue size and two coats of oil paint to the walls, but glue size direct to the plaster is unsafe on account of possible dampness, and if three coats of paint are specified, glue size will not be permitted to figure as a coat of paint. For good work on walls of hard plaster, a thin priming of white lead, thinned with raw oil and a small portion of turps, is recommended, on which a coat of glue size is applied to stop suction for succeeding coats, of which there should be not less than two.

—1728—

Putty for Parquet Floors.

An excellent putty for floors consists of a thorough mixture of paper, preferably blotting paper, which has been soaked in boiling hot water until pulp is formed, which is then mixed with glue, also dissolved in water. To this bolted whiting is added in sufficient quantity to make a fairly stiff putty by kneading the mass, which is pressed into the cracks and smoothed off with the spatula or putty knife. However, this putty is recommended for large cracks only, because unshrinkable, but is scarcely adapted for shallow cracks in a parquet floor. For this purpose we would recommend one part white lead in oil, mixed with two or three parts of bolted whiting and enough coach varnish to make a stiff paste. If the work must be hastened, coach japan may be substituted for part of the coach varnish. This putty will resist moisture, and when dry and hard may be sandpapered or rubbed, and it may be tinted with color if required to match the color of the wood.

—1729—

Backing for Gilding on Glass.

The best backing for gilding on glass when the same is to be shaded is dry lampblack mixed with quick-drying rubbing varnish and thinned with enough spirits of turpentine to make the material work evenly and freely. Or drop black ground in japan, thinned with turpentine to which a moderate portion of quick-drying varnish has been added, will serve the purpose also very well. Either of these will not soften under the shading color, and can be made to dry hard in less than 12 hours, but will not increase the burnish of the gold.

That is an entirely different matter, and depends on the condition of the size used in laying the leaf and on the subsequent treatment in burnishing. Some authorities recommend the use of gum arabic size, one drachm to one pint of boiling water, which is to be filtered through blotting paper, and to which, when cold, one teaspoonful of white whisky is added. Kept in a bottle well corked, it will keep for a year. The most favored size, however, consists of

isinglass, of which a piece the size of a nickel is dissolved in a pint of rain water, boiling hot. This solution is filtered through filtering or blotting paper, and when cold a tablespoonful of whisky or alcohol added.

If the use of asphaltum for backing the gold leaf is avoided and japan color thinned with rubbing varnish used, the gold will retain its burnish, because such colors will not strike in, as may be the case with asphaltum.

—1730—

To Paint Zinc Lined Bathtubs Successfully.

To make a good and durable job, the paint should be baked, but if this is out of the question, it must be air dried. After cleaning the zinc surface from grease, etc., wash thoroughly with dilute muriatic acid and rinse well with clear water. Dry the surface and give a coat of zinc white in oil, thinned with two-thirds oil and one-third turpentine, and a trifle of japan. Allow this to dry hard, then apply the flat color and varnish or give the required number of coats of so-called enamel. It is self-evident that only the very best material will give satisfactory wear.

—1731—

Effect of the Vapors in Stables on Oil Paint.

The inside of a stable having rough plastered walls and brick arched ceiling was painted in the fall with oil paint. But during the winter the ceiling dripped with moisture and the coachman attempted to wash it with soap and water, when the paint came off like whitewash.

It is well known that ammonia vapors form in stables, and that during the winter especially, when there is little airing of such places, the ammonia vapors are bound to seek an escape somewhere, and naturally an arched ceiling will be first attacked. The paint becomes saponified and runs, and the least friction, as in this case, by washing, will remove it completely. This has been recognized for quite a time, and the general practice is to have stables finished in hard wood, with a good varnish coating, which, after all, resists ammonia vapors better than oil paint. The painter cannot be blamed for the perishing of the paint, because he cannot estimate in advance the possible degree of deteriorating influences from this source.

—1732—

To Make Cloth Waterproof and Elastic.

Take one-half pound pure Para rubber, cut into small pieces and dissolve in enough disulphide of carbon to make a liquid mass of the consistency of thin syrup. Also melt two pounds of rosin, and add to this two gallons of oil, previously boiled with litharge; in other words, heating the oil and rosin together, take from fire, and before the mass becomes quite cold, add the rubber solution. Should this composition dry too slow, add some good drying japan, sufficient to dry in 36 or 48 hours. The mixture should be applied warm, and if too thick, heat it in a sand or water bath without direct flame. The cloth must be previously soaked in a solution of alum and water. Any drying color may be added to this mixture.

—1733—

Proper Preparation of Wax Finish in Color.

Proceed for the priming and subsequent coat or coats same as for an oil color finish, thin for thin coat, with equal parts of oil and turps, adding enough beeswax, that has been dissolved in turpentine, to give a dead sort of gloss.

In order to obtain a surface thoroughly uniform, some water is added to the paint, which, on brushing out, lies over the surface like dew and allows the workman to paint without laps or shiners, because it does not permit the turpentine to evaporate quickly. Should the surface be uneven in spite of good workmanship, a coat of sour milk or buttermilk is said to remedy the defects.

—1734—

Carbolineum Avenarius an Ideal Wood Preservative.

"Carbolineum was discovered by an officer in the Prussian Army in 1870 in his efforts to produce a compound which would preserve the vineyard stakes in the Rhine valley from decay. R. Avenarius, the original inventor, has since made many valuable improvements and patented the same in all parts of the globe, and very favorable reports of its efficiency as a preservative of wood from dry or wet rot have been made to the Imperial Government of Germany, as well as by the United States Department of Agriculture. From these reports it appears that it is adapted for the impregnation of wood subjected to dry or wet, as well as where dryness and dampness alternate, and that it is much more effective than liquid coal tar and more economical in the long run, as one gallon will cover 25 square yards of rough timber, and because it is a powerful disinfectant as well. The American Architect and Building News says of the compound:—"It has for its basis the best and purest heavy coal tar oils, or dead oil, to which are added other powerful antiseptics, including that most powerful of all, chlorine, which induces such chemical changes in the crystallizable constituents of the dead oil as greatly to add to its efficiency and penetrability, making the liquid self impregnating and dispensing with the expense of a plant and machinery and the transportation of the lumber." It may be well to add that in cases where the timber is kiln dried and for parts that go under ground, the carbolineum must be applied hot in order to make it penetrate more deeply, while on the parts that remain above ground in warm weather on air dried lumber the cold compound may be employed.

—1735—

United States Lighthouse Paint.

A few years ago the Government used a cheap white or buff-colored water paint on lighthouses and the stone surrounding them, which stood fairly well.

The paint in question is, or was, prepared as follows:—One-half bushel of lime is slaked with boiling water and kept covered during the slaking process to keep in the steam. When cold, it is strained through an ordinary sieve or paint strainer, then one peck of salt dissolved in warm water, three pounds of rice flour stirred in water and boiled to a thin paste, one pound Spanish whiting and one pound pale glue, also dissolved, are added to the strained lime mixture, thoroughly stirred and allowed to stand well covered for several days before using. Before applying, the wash must be warmed up in a kettle or portable furnace and applied with wall brushes as hot as can be done without injuring the bristles. This paint is said to wear well on wood, brick or stone. To produce the buff tone, use French ocher as coloring, but no chrome yellow; and if a reddish buff is required, use Venetian red and ocher.

—1736—

To Prevent Zinc White from Becoming Yellow.

The yellowing off of zinc white on interior work may be traced to several causes, such as carelessness in dusting or cleaning of walls and ceilings, preparatory to painting, insufficient ventilation and the shutting out of light

afterwards, the placing of furniture, etc., too close to the walls, but principally to the thinner used with zinc white, such as dark oil, dark driers, and the use of too much turpentine or the use of varnish that contains a liberal portion of oil.

To prevent discoloration it is necessary to have the room well dusted and aired and the walls, etc., well washed down with lukewarm water, to which a little soap has been added, rinsed with clear water and rubbed dry with rough, coarse sackcloth.

If you can afford it use French process zinc white ground in poppyseed oil, and thin with pure turps only for flat work, but for eggshell gloss finish add one or two tablespoonsful of either poppy oil or bleached linseed oil for every two pounds of zinc, and in either case a dessertspoonful of white japan. If you use linseed oil, take it well aged and do not use the sun-bleached article. You can age and bleach your linseed oil so that it will remain clear and pale by keeping it in open bottles or glasses in shady, airy places.

While the zinc coats are drying the rooms must be aired in order to allow the turpentine vapors to escape, and the more time for drying is allowed between coats, the whiter the job will turn out finally. It is well to suggest that furniture should not be placed against the walls until the paint has had a fair opportunity to thoroughly harden. For glosswork it is best to use zinc white that has been ground in damar varnish, and thin with a trifle of turpentine and bring it to proper consistency with pale damar varnish.

—1737—

Silvering on Glass.

When working out a formula do not be discouraged if the first or second attempts prove abortive, but sit down and think awhile, and perhaps you will find that there is one point or another which you have not thought of before and then try again. You state, for instance, that you warmed the plate glass to the temperature of the air. This is not sufficient, but your glass should be warmed through thoroughly; it should be at least 105 deg. F., otherwise the solution becomes chilled too rapidly, causing non-adhesion. You may have cleaned the glass with ammonia and then with alcohol, and yet it may not have been fit to receive the mercurial solution. Try again, giving the glass a first wash with aqua fortis, rinse with soft water, dry and rub with finest whiting and water, polish with chamois skin, then moisten with alcohol, dry with clean cloth, then warm as above.

—1738—

How Chamois Skins Should Be Treated.

Chamois skins should never be left in water after using, but should be wrung out and hung up to dry, and spread out carefully so as to leave no wrinkles; neither should they be used to wipe soft colors, because paint stains form hard spots and help to wear out the skins more rapidly. Neither should the hands be wiped on chamois skin, as it is liable to become greasy thereby. Never put the skin in hot water—nothing more than lukewarm, as it will curl up and become tough. If a chamois skin has been ruined by paint or grease, it is recommended to soak it in a bucket of soft, clear water, to which has been added a gill or two of ammonia over night, and next morning rinse it out in pure water, after which use freely of white castile soap and water. This process need not require over fifteen minutes' time, and it is said than when so treated the skin is of better service than a new one, because it has been broken in and is free from lint.

—1739—

Paste for Fastening Oilcloth to Wood.

Mix one pound wheat flour with two quarts of water, in which has been dissolved one quarter ounce of alum, and while constantly stirring with a

wooden stick boil the mixture until mushy, so that the stick will stand in it. This tough paste is applied to the table top and the oilcloth laid thereon and smoothed out from the center toward the edges, so that there will be no wrinkles or blisters.

—1740—

Restoring the Gloss on Linoleum.

Floor varnish is not advisable. A better method and less destructive to the cloth is to rub over the cloth with a mixture of one part each of paraffine and palm oil, thinned with four parts kerosene oil.

—1741—

Imitating Ground or Frosted Glass.

The trustees of a church wanted the windows renovated. The glass had been painted seven years before, partly in imitation of stained glass and partly with white lead in oil, turps and drier, tinted a light blue. While the imitation of stained glass had stood well, the light blue paint all came off, and this they wished removed. The painter who was to do the work had heard there was an acid which could be applied to the glass to give a perfect imitation of ground glass.

Your informant is correct. There is an acid that will eat into glass and give it the effect of having been ground, but it will not suit your case. You would have to take out the windows, clean them thoroughly, coat the sash edges with wax to protect them from the acid, and afterward remove the wax again. The acid he has reference to is hydrofluoric acid, made by dissolving powdered fluorspar in sulphuric acid. This must be kept in leaden or gutta percha bottles, and cannot be applied with a brush, but the glass is laid flat and the acid poured over it, and as soon as it has taken effect, that is, as soon as the glass is obscure, the acid is poured off and the glass rinsed with cold water. You would have to be very careful in using the acid, as it is very powerful, and we would suggest to you to employ any one of the following methods:—

Make a solution of gum arabic in water and dissolve in this solution all the Rochelle salts it will take up, let it stand over night and after the glass is well cleaned, flow on the solution, so that it will not run, which can be done with a soft, flat varnish brush, where it is convenient to lay the glass flat. When dry, flow on a thin coat of damar varnish. The solution may be tinted or colored with colors in distemper.

Or use white sugar of lead, ground fine in oil, apply this same as any oil paint; color, if desired, and pounce, while the paint is still fresh, with a wad of cotton batting, held between thumb and finger.

Still another method which strikes us as the most convenient, is to take white lead in distemper, that is, white lead ground fine in water to a stiff paste, thin it down to a brushing consistency with a solution of gum arabic and common salt in soft water. This may be colored or tinted to suit, and will adhere so well that it will eat into the glass and last for years. If on application it shows brush marks, go over it with a mottler or stipple it.

Should you desire to use ordinary oil paint, thin the paste with equal parts boiled linseed oil and turpentine, in which some beeswax has been dissolved, apply it with the brush and rub out well, then take muslin cloth of fine grain, dampen it somewhat and place inside a wad of cotton and with this bag pounce the paint all over, so as to show no brush marks whatever.

—1742—

Lacquer for Brass and Its Mode of Application.

The formulas for spirit varnishes referred to by you were not published as lacquers for brass, but for general ornamental work, the idea being more to

show what is to be expected of such varnishes than to recommend them for practical work. In lacquering brass, the metal must be cleaned from all grease, etc., by the use of the following or a similar paste:—One ounce oxalic acid, six ounces of rotten stone, one-half ounce of gum arabic or dextrine are made into fine powder and mixed to a paste with sweet oil. This is applied to the brass and rubbed dry with a flannel, then with another clean dry piece of flannel or woolen cloth the surface is polished. To make a good brass lacquer mix one pound pale orange shellac, four ounces turmeric, one ounce annatto, one-half ounce saffron in one gallon 95 per cent. grain alcohol, let all digest, then filter through asbestos fiber to clear. Before using the lacquer on a large surface, try it on a small piece of brass, and if the finish appears cloudy the lacquer may require thinning, which can be done with more alcohol. Remember, the metal must not be too cold when lacquer is applied, and it may be practical to put it in a water bath during use. Lacquered brass should not be polished with the usual polishing mediums, as they will simply take off the lacquer sooner or later. Dusting off or wiping with a moist chamois leather is all that is required to keep it clean.

—1743—

To Remove the Old Paint and Varnish from Hobby Horses.

We have had no special experience in that work, but think that you had best try the torch, if you wish to make any headway. A lye or soda solution would, no doubt, prove most effective and would scarcely affect the glued joints very seriously, but it would raise the grain of the wood in such a manner that you would be unable to produce good work in repainting. American fusel oil, free from water, is a first-class remover of varnish, but the work is tedious when there are heavy coatings to be removed, and the fumes are rather injurious to the system of the operator. A mixture of two parts by volume of aqua ammonia and one volume of spirits of turpentine produces an emulsion that softens paint and varnish and does not raise the grain of the wood, but its action on old coatings is very slow and tedious. Try the various methods described here on one or more of the animals, and you will probably find that the burning off of the paint with a gasoline torch that is dexterously handled will prove the most rapid as well as the most economical and cleanest method of all. If you work quickly, you need have no fear of softening the glue in the joints. Have the necessary sticks and scrapers ready that you need to remove the softened paint from the carved portions before you make a start.

—1744—

Causes for the Creeping of Paint and Their Remedy.

Creeping or crawling of paint amounts to the same thing, and is caused either by a greasy surface or by too high a gloss of the under coats. When an old surface is to be repainted, as in kitchens, etc., the walls and woodwork must be cleaned thoroughly with soapsuds or ammonia and water, well rinsed and allowed to dry thoroughly before beginning to paint. On the exterior of buildings it is principally in the sheltered places that paint creeps or crawls, because there the gloss of the old paint usually remains, because the elements have had no opportunity to attack the paint and destroy the gloss. It is well to add some turpentine to oil paint for use in these places. A trifle of a weak solution of potash added to the paint will prevent its crawling.

—1745—

Mixing Certain Colors, Tints and Hues.

Owing to the varying strength of the different brands in commerce, we shall refrain from giving proportions, placing the name of the color of which the largest quantity is required first, and that of which the least is required last.

The colors we select for the combinations are such as would be used by artists and decorators, but not for the ordinary purposes of the house painter.

AMBER.—Yellow lake with a little white or red lake and chrome yellow.

ASHES OF ROSES.—White carmine or red lake tinged with ivory black.

BISMARCK BROWN.—Burnt umber, Dutch pink and red lake.

BURGUNDY.—Asphaltum with good red lake.

CLARET.—Any good purple lake or carmine and a trifle of ultramarine blue.

DUCKS' EGG.—White, ultramarine blue, chrome yellow.

INVISIBLE GREEN.—Lamp or drop black and very little medium chrome yellow.

TEA GREEN.—Raw umber, chrome green and ocher.

WILLOW GREEN.—Verdigris and white.

LEATHER COLOR.—Burnt sienna, burnt umber, subdued with enough white to produce effect.

LIME STONE.—White, yellow ocher and a little black and red each.

PEACH BLOSSOM.—White and king's yellow (orpiment).

PLUM.—White, ultramarine blue, red lake or carmine and a little drop black.

PORTLAND STONE.—Raw umber, yellow ocher and white enough to produce effect.

SAND STONE.—White, yellow ocher with very little black and red.

SLATE.—Lampblack, white, blue and a trifle red.

STONE COLOR.—White, yellow ocher, burnt umber.

VIOLET.—Carmine, ultramarine blue and a trifle black.

—1746—

Marble Polish and Cement for Marble.

Melt in a hot water bath one pound of Chinese or Japan wax or carnauba wax; when melted, add one gallon spirits of turpentine and take from the bath, stirring it well in. Apply to the dry marble and rub with a soft cloth until the desired polish is obtained. The gold size may be omitted, but the polish will not be as brilliant or as durable. To make it wear well rub daily with a dry cloth.

To cement marble to marble, mix sifted oyster shell lime and finely powdered gum arabic with water to a fairly stout mush, which apply in thin layer to both fractures and press firmly together, then allow to remain undisturbed for twenty-four hours and remove with a sharp knife the part of cement that has been squeezed out.

—1747—

Attaching a Block and Fall to a Smokestack.

An iron smokestack of the height of fifty to sixty feet is generally of a fair diameter, and has knees or brackets riveted on inside on which to get to the top. A man climbs up on these and takes with him a rope, one end of which he throws to the ground, and then pulls up hooks, block and fall. If the stack is not provided with brackets in the manner described, it will be necessary to have extension ladders or scaffold.

—1748—

To Climb a Flagpole Without Climbing Spurs.

We have seen men climb poles over 100 feet in height without anything but their stockings on, while others came down again in a hurry before they were up 25 feet. It depends on your agility and gymnastic training, as well as your physical ability. If you are lacking in these qualities you had better remain on the ground, unless it pays you to erect a scaffold. But why not use the climbing spurs, as a flagpole is painted from the top downward and the mar-
ring could be obliterated?

—1749—

Heating Dipping Paints in Vats.

The question was asked whether it was advisable to run steam pipes into dipping vats to keep the paint warm and make it run or drip more freely.

Although we have no direct experience in that line, we may say that the idea strikes us as an excellent one providing the pipes can be so placed that they will not interfere with the proper working of the vat, and held at such a temperature that part of the paint will not be baked. They will then act the same as a steam-jacket about an iron or copper kettle or mixer, and act as well or even better at less expense. The only drawback to perfect success by this method during freezing weather is that if the implements that are to be dipped and the room in which they are to be dried after being dipped are not of approximately the same temperature the result may be worse than if the paint is not warmed at all, because the paint on coming in contact with a chilled surface or being placed to dry in a chilled atmosphere will tend to creep or crawl. If the paint is warmed up to 80 or 90 deg. F., the temperature of the implements on immersion should not be below 65 deg. F., and the temperature of the drying room not less than 70 deg. F. We should certainly advise the making of a trial on a minor scale.

—1750—

How to Produce Frosted Mirrors in a Simple Way.

Beautiful frosted effects, of a temporary character, are often used in public houses, barber shops, stores, etc.

These mirrors are covered with a solution of epsom salts in stale beer, which is applied with a sponge to the mirror plate that has been wiped clean and dry previously. On drying, the epsom salt crystalizes, giving very handsome frosted effects, but the solution must not be applied on humid days, when the glass is liable to be damp, for in that case the effect will be a blurred one. When it is desirable to remove the coating, lukewarm water will serve the purpose without damage to the luster of the mirror.

—1751—

Simple Methods to Fasten Leather or Oilcloth to Table or Desk Tops.

You may use the same paste for leather as you do for oilcloth or other goods, but the leather must first be moistened before the paste is applied. We would advise you to prepare your paste as follows:—Mix two and one-quarter pounds of good wheat flour with two tablespoonfuls of pulverized gum arabic or powdered rosin and two tablespoonfuls of pulverized alum in a clean dish with water enough to make a uniformly thick batter; set it over a slow fire and stir continuously until the paste is uniform and free from lumps. When the mass has become so stout that the wooden spoon or stick will stand in it upright, it is taken from the fire and placed in another dish and covered so that no skin will form on top. When cold, the table top, desk top, etc., is covered with a thin coat of the paste, the cloth, etc., carefully laid on and smoothed from the center towards the edges with a rolling pin. The trimming of edges is accomplished when the paste has dried. To smooth out the leather after pasting, a woolen cloth is of the best service.

—1752—

Coating the Inside of Bakers' Delivery Wagons to Prevent Bulging.

We do not think that this feature comes within the scope of the painter, but rather belongs to the wagon builder. Sheathing, similar to that used in railway baggage cars, should be employed on the inside of such wagon bodies and tops. The sides and top could be lined with sheet zinc, placing roofing felt or

similar material between the wood and the sheet zinc. As paint, however, does not well adhere to zinc, the surface requires treatment to make the paint hold on, which can be done by first giving it a wash of the following solution:—One part, by weight, each of chloride of copper, nitrate of copper, sal ammoniac, dissolved in 64 parts of water. Do not use a tin pot for making solution, but an earthen or glass vessel. When solution is made, add one part of commercial muriatic acid and apply with a flat brush. The zinc will blacken, but on drying out there will be a gray film, on which any paint will adhere. Coat with flat drying paint and varnish over with good, hard rubbing varnish.

—1753—

Painters' Cream.

Painters' cream is a sort of emulsion used by artists to cover their paintings with temporarily during transportation or when buildings containing costly or treasured works of art are renovated, and is made as follows:—Gum mastic, 2 ounces dissolved in 14 ounces pale nut oil by heat; add to this one-half ounce by weight of white sugar of lead, previously ground fine in linseed oil; then add water slowly and gradually until an emulsion of the consistency of cream is formed. This cream can be removed readily with sponge and water.

—1754—

White or Obscuring Acid for Glass Embossing.

A mixture of one-third fluoric acid and two-thirds liquid ammonia. Must be kept in leaden or gutta percha bottles.

—1755—

How Stove Blacking May Be Prepared.

Commercial stove blacking paste is usually made by grinding graphite in water through a mill to impalpable fineness. The paste is placed in forms and dried by heat. In using it is mixed with water, applied wet, permitted to dry and brought to a polish with brush or cloth.

A better grade of stove polish is made by mixing finest pulverized graphite with its own weight of spirits of turpentine and adding for every pound of graphite used one ounce of water and one ounce of brown sugar. This is pressed into forms and allowed to dry.

Liquid stove polish is made by mixing one part, by weight, of finely powdered bone black and one part, by weight, of pulverized graphite with two parts, by weight, of pulverized copperas, to which enough water is added to form a creamy paste.

—1756—

Softening and Utilizing Paint Skins.

When the skins are very old, dried up and hard like stone, it is cheapest to throw them on some dump, but when they are merely tough and appear dry without being like so much hardened cement, they may be cut up with a chopper, placed in a kettle over a fire, with a small quantity of oil and boiled at low heat, while continually stirring, so that they will not scorch on the sides. When the lumps are well broken up and soft, add more oil and boil further; then take kettle from fire and put the material, while still hot, through a paint strainer. If not fine enough, run through a paint mill, then thin with oil and turps to proper consistency for application, adding, if required, a small portion of driers. This makes a very elastic and durable paint for roofs, fences, etc., but it is not safe to use for priming new wood work. If the skins are fairly soft, they may be dissolved in a solution of one pound of sal soda in four gallons of water,

which will require from six days to two weeks, if stirred occasionally, and finally put through a paint strainer, after pouring off the water. Paint so made can be utilized for rough work, such as painting barns, fences etc., only, and is unfit for priming new work.

—1757—

Preparation to Keep Sliding Windows and Shutters from Screeching.

Make a lubricating soap by melting together three parts, by weight, of tallow, six parts, by weight, of palm oil, and three parts, by weight, of a 15 deg. solution of carbonate of soda. Apply to the parts that create the friction, be it the edges of windows or shutters or the sash ropes.

—1758—

What Is Hydraulic Lime?

Hydraulic lime is a species of lime that hardens under water or which can be used in making hydraulic cement. Portland and Roman cements as made in Europe are both hydraulic, and the Rosendale cement manufactured in the United States must also be classed in the same category. If limestone is ground in water, then dried and calcined at high heat, the resulting material is hydraulic lime, because it will harden, when mixed with water and also under water. Calcined chalk will also answer the purpose to a certain extent, but will not become quite as hard as calcined limestone.

—1759—

How Decalcomania Transfer Ornaments Are Applied.

Coat over very thinly the gold back of the transfer with coach varnish, and you need not be particular whether you get the varnish on the paper outside of the figure or not. Lay the ornament or picture to one side until the varnish becomes quite tacky, then lay it on the desired place and rub gently with a moistened sponge until all the parts are flattened down. Allow this about one-half hour to dry, then wet the paper with a soft sponge and cold water until it lifts off easily, when the printed figure will be left perfect on the panel. With a soft rag dipped in turpentine, gently rub over the whole to remove the surplus varnish, and the work is complete.

—1760—

Vellum, Its Origin and Value to the Painter.

Vellum is a fine kind of parchment prepared from the skins of calves, lambs, or goat kids. The skins are immersed in lime, then shaved, washed and stretched on frames, where they are scraped and trimmed with the currier's fleshing knife. Next they are carefully rubbed to smoothness with pumice stone and finally polished with French chalk or fresh slaked lime, finely sifted and then dried. A bluish color is given them with a solution of indigo, while the green color is produced from a solution of verdigris, to which a mordant or fixative has been added. To produce a very fine, velvet surface, the whites of eggs are employed and subsequent friction. Vellum and parchment are used by artists, as a painting ground for water colors, when they wish to employ something more durable than the ordinary sized paper, and Church, in his "Chemistry of Paints and Painting," says that water color paints placed on vellum, parchment and ivory sink either very slightly or not at all into their substance—a very few, such as aureolin, strontia yellow and madder carmine, stain the superficial layer. The old method of preparing vellum for the reception of water colors consisted in rubbing the surface with very finely ground

bone ash, or with pulverized gum sandarac. Pumice stone or cuttlefish, reduced to a minutely divided state by grinding and sifting, also answers the purpose. We, however, believe that vellum, as used at present, is an imitation only of what it has been and is manufactured at the paper mills by modern process, similar to that of parchment paper.

—1761—

Sanitary White Paint for the Inside of a Wooden Tank Containing Drinking Water.

In the first place the tank must be dry before it can be painted. When the wood is water soaked, paint will not adhere. Naturally white lead in oil would be best for priming coat, but medical authorities are opposed to the use of lead or lead salts in minute quantities even. This leaves oxide of zinc as the only safe white pigment that has covering power enough for the purpose, because some authorities draw the line also against the insoluble lead sulphate and against lithopone white. Zinc white, ground in pure raw linseed oil and thinned with manganese boiled oil and some turpentine may be employed as a coating without injury to the health of those using the water.

—1762—

Stopping or Waterproofing a Wooden Tank Without Injury to the Water.

No matter what material you are going to use it will not adhere or serve the purpose, unless the tank is drained well and permitted to dry out thoroughly. Then the hoops must be tightened and the inside be given a coat or two of hot paraffin oil or melted paraffin wax, applied hot. This done, give the iron or steel hoops a coat of red lead and the outside of the tank one or two coats of good, offer for this class of work.

elastic oil paint of any color desired. This is the best suggestion we have to

—1763—

Making Water Colors by the Painter.

It would be a waste of time and of little or no benefit to our readers to give formulas or describe the process of making water colors when they can be bought much cheaper from the manufacturer who prepares them on a large scale. Assuming that the painter has a mill in his shop, will he be able to buy his raw materials on a small scale as cheaply as the manufacturer, and how much labor and inconvenience must he put himself to until he can produce the product as fine as the color grinder, with his up-to-date mill? Most of the colors are in the pulp state at the color works and need not be dried, but can be put on the mills direct, making a saving in cost, while the painter is obliged to buy the color in the dry state, then to mix and soak it in water and finally grind it to impalpable fineness. Where is the economy?

—1764—

Practical Method of Painting on Velvet and Similar Fabrics.

There is a very simple method which can be handled in such a manner that neither fabric nor the painting will be injured. First trim a small fitch with a pair of scissors, so that the bristles are not over one-eighth of an inch in length; make it round at the point. Use oil colors in collapsible tubes and place the color on blotting paper, so that some of the oil may be soaked up and the color be quite stiff. Then, after having stamped your design on the

velvet, dip your brush in the color and proceed to comb the nap of the velvet with it. The depth of color depends on the number of times you have applied the brush in the manner described, as the combing of the nap with the brush simply stains the nap and leaves it flexible and therefore more durable than by any other method.

—1765—

Pyrographing on Wood and Leather.

The process referred to is termed pyrography, and the work itself pyrographing. In practice, it is done by stamping the designs on wood or leather and burning in the outlines with needles or tools of various shapes, heated by electricity, while the amateur shapes pieces of steel wire to suit the work in hand, heating the same in the fire or gas furnace. A little genius, combined with practice, enables the amateur to turn out some pretty work in pyrography.

—1766—

Substitute for Gutta Percha for Insulating.

We do not know where a good substitute for gutta percha may be procured, but can recommend the following composition as being a good insulator and considerably cheaper than the pure article:—

Eighteen parts by weight of pitch, 9 parts by weight of calcium hydrate (slaked lime), 24 parts by weight of pure gutta percha.

For the pitch, coal tar may be substituted, and in either case the solvent used for the pure gutta percha may be used. A good composition for insulating may be made of one part Swedish tar, one part rosin and three parts of gutta percha, all by weight.

—1767—

Coating for Oil Skins, Such as Are Worn by Seamen and Fishermen.

To make seamen's oil skins fine drilled calico is dipped into bullock's blood and dried thoroughly in a current of air; then 2 or 3 coats of raw linseed oil are applied by dipping or brushing and allowing each coat to dry thoroughly before applying another. The oil must be prepared by adding one ounce of powdered litharge to each pint of the oil, stirring it occasionally, and allowing to settle after 24 hours, then decanting the oil from the sediment of litharge. The drying should be accomplished under a shed, where there is a good current of air, but where the cloth is protected from the rays of the sun and from rain. For yellow goods a little medium chrome yellow ground in oil or French ocher may be added to the oil; for black goods, lampblack in oil is the best coloring agent.

To waterproof fishermen's coats of linen or muslin make a stout paint of yellow ocher for yellow or of lampblack for black, using these colors ground in oil, thinning with pure boiled linseed oil only and add to each quart of the paint one ounce of brown soap that has been dissolved by moderate heat in some of the oil used for thinning. Lay the goods on a table and apply the paint with a stiff brush, rubbing it in well; then hang the cloth up to dry in the most airy place at your command. If it is more convenient, do not put the soap into the oil or paint, but in painting take the brown soap in your left hand and every time the brush is to be refilled with paint rub it first over the soap. This method is troublesome, but the result is quite gratifying. Two coatings are necessary.

A simpler and cheaper method of waterproofing canvas or muslin, linen, etc., is to dissolve 4 ounces of yellow soap in 6 pints of water by boiling, then stirring into the solution, while still on the fire, one gallon of boiled linseed oil, and when well mixed and limpid, it is taken from the fire and allowed to cool. When cold one pint of gold size is added. This preparation may be colored with chrome yellow for yellow and lampblack for black.

—1768—

Dissolving Rubber so as to Mix With Oil.

Caoutchouc, or Para rubber, can be dissolved in disulphide of carbon, with coal tar benzol or with spirits of turpentine, and when the solution is liquid enough it will mix readily with oil. The rubber is cut into thin strips, put into a suitable tightly closing vessel and the solvent poured over it, so that the strips are fully covered, allowed to stand in a warm place and shaken frequently. When the mass is too much like a thick jelly, more solvent must be added until the desired fluidity is obtained. This accomplished, the solution can be mixed in varying proportions with boiled linseed oil, but it should be first strained to remove the unavoidable sediment, and oil and solution should be heated on a sand bath to make them amalgamate thoroughly. Solutions with coal tar benzol or turpentine are preferable to those made with disulphide of carbon, because of the fugitive character of the latter, which, when evaporated, is liable to leave behind the rubber in the oil in its original form, or at least in the shape of soft lumps.

—1769—

To Make Plush Adhere to Metal Permanently.

Plush was to be fastened on the bottom of certain heavy tin boxes to prevent scratching the tops of tables on which they were placed.

Wash off with ordinary soda water the bottom of the tin boxes, wiping it dry with cloth. Coat tin with the juice of onion and press on this space a piece of fairly strong paper, smoothing it out so that there will be no blisters. When this has dried, the paper will adhere so that it can be removed only by scraping with a sharp instrument. Now give a coat of hot glue to the paper and press your plush down into the glue, and when dry and hard, the plush can be removed only by placing the tin box in boiling water.

—1770—

How to Fasten Celluloid to Other Articles.

Take two parts by weight of bleached or orange shellac, according to your necessities as to color, three parts by weight of spirits of camphor and four parts by weight of 95 per cent. grain alcohol, put all in a well stoppered bottle, shake frequently, and when the shellac has dissolved it is ready for use as a cement to fasten celluloid to wood, tin, iron or other metal, and also to glass.

—1771—

To Fasten Cloth to Stone to Adhere Permanently.

There is no composition known to us which would hold cloth on polished marble or other stone, because the polish would not permit adhesion. But by taking a coarse file or rasp and going over the polish to roughen the surface, and then warming the same by placing hot sand upon it, the job can be accomplished in this manner:—Remove the sand before it becomes cold, then give the warm surface a good coat of ordinary joiner's glue and place your cloth down quickly, pressing down hard and smoothing it out from the center toward the edges. When the glue is hard, trim the edges.

—1772—

To Attach Pearl to Glass Without Marring the Beauty of the Pearl

Take a clean pencil brush and a little clear damar varnish and go over the openings of the letters, two or three at a time, running a little over on the

letter all around. Lay on your pearl carefully, breaking it into the proper size and fitting it as closely together as possible, until the opening is covered. When the varnish is dry and hard, the pearl is firmly attached. Now mix a little silver gray or pearl gray and coat over the pearl, covering all the openings.

—1773—

Mounting Photographs on Glass.

While we have not tried the formulas ourselves, we are advised that the best mounting paste for glass is the following:—

Nelson's No. 1 photographic gelatine.....	4 ozs.
Water (filtered)	16 ozs.
Refined glycerine	1 oz.
Grain alcohol, 95 per cent.....	5 ozs.

Dissolve the gelatine in the water, then add the glycerine, and finally the alcohol. This paste is transparent and will not show white on the glass or obscure the picture.

If you cannot readily obtain the photographic gelatine referred to, purchase the finest quality of cooking or confectioners' gelatine, which comes in very thin, transparent sheets, and make your paste as follows:—

Cooking gelatine	1 oz.
Alcohol, 95 per cent.....	10 ozs.
Refined glycerine	1 oz. or less

Soak the gelatine in cold water for at least one hour, take out and drain off all the water possible, then put in a wide mouthed bottle with the alcohol and the glycerine. Put bottle in hot water and shake occasionally until gelatine is dissolved. Cork bottle and when desiring to use paste, put bottle in hot water.

—1774—

To Make Emery Wheels and Emery Sticks.

Turn the wheels out of well seasoned pine to desired diameter and width, place emery of the proper size or fineness upon a plate heated to a temperature of about 200 degrees F., but not over 212 degrees F. Coat the wheels with glue of the consistency used for uniting or joining wood and roll the wheels into the warm emery. After the glue is dry the surplus is brushed off and another coat of glue is applied and the wheel again rolled in the warm emery. The wheels must become thoroughly dry and hard before use. If two coats are insufficient to cover well, apply three of them. For emery sticks, prepare the sticks of the shape desired, then coat them in the same manner as the wheels or attach emery cloth by means of hot glue.

—1775—

Fluxes for Fusing of Metals and for Soldering.

Flux for soldering zinc or tin is best prepared by dropping small bits of zinc into hydrochloric acid that is mixed with its own bulk of water. For welding steel, use borax or sal ammoniac. For soldering tinned iron, use rosin or chloride of zinc. To weld or solder copper and brass use sal ammoniac or chloride of zinc, and for soldering zinc use the latter also. For lead use tallow or rosin, for lead and tin pipes use rosin and sweet oil. Fluxes for fusing refractory substances are:—Ammonium chloride (sal ammoniac) is used in melting and purifying gold. Sodium chloride (common salt) is used to free certain metals from such compounds as antimony and arsenic. Borax (biborate of soda) forms fusible compounds with silica and many metallic oxides, absorbing infusible impurities. Sodium carbonate (sal soda) acts as a desulphurizer and has the property of oxidizing such metals as tin, iron and zinc. It has nearly similar qualities to

borax and when mixed with carbonate of potash it forms a double salt, which fuses at a lower temperature than either used alone.

Potassium nitrate (saltpeter) and sodium nitrate (also known as saltpeter) act pretty much alike, both fusing below redness and being decomposed at higher temperatures, yielding large volumes of oxygen, thus liberating the sulphur of metallic sulphides into sulphurous acid and the metal into oxide.

Potassium bitartrate (cream of tartar) is valuable where much carbonaceous matter is required.

Potassium cyanide (cyanide of potash) is very useful as a flux for fusing many metals when mixed with sodium carbonate or carbonate of potash. Other fluxes are calcium oxide (lime), calcium fluoride (flourspar), lead oxides (litharge) red lead, manganese dioxide (black manganese), silica or silex (sand or quartz), china clay (kaolin), glass which is a mixture of the silicates of soda and potash with some insoluble silicates, like those of barium, magnesium, aluminum, iron and lead, also ferric oxide and zinc oxide.

—1776—

Dextrine: Manufacture and Properties.

Dextrine, also known as British or starch gum, is a soluble substance resembling gum and is formed by the action of dilute acids at the boiling temperature and by the infusion of malt at about 100 degrees F. on starch. It is also formed when potato starch is heated to 400 degrees F. Used extensively in the manufacture of mucilages, pastes, paper sizes, etc. Its name is derived from the action of its solution on polarized light; it causes the plane of polarization to deviate to the right.

Commercial dextrine or British gum is obtained by heating dry potato starch to a temperature of 750 degrees F. in sheet iron trays or revolving drums, made of iron or copper, similar to those used in coffee roasting, where it is transformed into semi-transparent brownish lumps, which are converted into pale yellow powder by grinding between millstones. It is perfectly soluble in cold water, from which it may be precipitated by addition of excess of strong alcohol. Potato starch is mostly used, but other starch will also answer. The best test to ascertain its purity is to agitate briskly a few grains of the dextrine in a test tube with 50 times its weight of pure water; set it aside for ten minutes. If not all dissolved, pour off the solution, add a little water to the residue, heat to boiling, let cool and add a few drops of iodine water; a blue color indicates the presence of starch.

—1777—

Paint for Inside of Standpipe of Water Works.

Formula for a paint for the inside of a water works reservoir or standpipe, the water of which is used for drinking purposes and will, of course, require a paint that contains no poisonous substance and one that will in a way prevent the metal from rusting.

If the color of the paint is no particular object, a red or brown pigment, consisting of a fair percentage of oxide of iron, at least 40 per cent., with a natural gangue, containing silica and not too much alumina, free from sulphur in any form, ground in pure raw linseed oil or boiled linseed oil (that is prepared with manganese oxide only), to a paste and then thinned with hard gum varnish that contains no lead salts as driers of any kind, to brushing consistency, is non-poisonous. If another color of lighter shade is required the white base must not be in the form of lead, be it carbonate or sulphate, nor would we suggest the use of lithopone, but instead the use of pure American zinc oxide, free from lead sulphate. The zinc oxide to be ground in raw linseed oil and tinted with bone black and ultramarine blue for lead color, with lampblack for steel color, with best French yellow ocher for buff or with red oxide for pink. For a sea green tint, as chrome green is out of the question, would suggest coloring

the zinc white base with zinc yellow and ultramarine blue, the oxide of chromium green being too expensive, although more permanent and perfectly non-poisonous. Borate of manganese drier only should be used and the varnish for thinning the paint must be free from lead salts and must be made from hard gum. Rosin, damar and manila gum will not withstand the action of water. Much of the success of paint of this kind depends very largely upon the care exercised in the application. Two coats at least are required, the paint thoroughly brushed out and care taken that no spots are missed. To prevent the latter it is well to have the first coat of a different color from the second, so that inspection may be had without difficulty.

—1778—

Soluble or Water Glass and Its Uses.

Silicate of soda, also known as soluble glass, but more commonly as water glass and silicate of potash, are white salts of silicic acid, precipitated by soda or potash as the case may be. In white heat these salts smelt like glass and become readily soluble in water, hence the term waterglass, or soluble glass. The solution can be made of the consistency of thick syrup by evaporation. Acids separate from soluble glass silicic acid H_4SiO_4 —in the form of a brittle, earthy mass, which is then insoluble in water. Silicic acid loses on heating its water of crystallization and is converted into silicon dioxide, SiO_2 —a mineral which is found in nature in various forms, such as quartz, flint, Kieselguhr, sand, infusorial earth, silex, silica, etc. The salts of silicon are known as silicates and are, with the exception of those of alkaline nature, insoluble in water; they form as solid minerals the great mass of the earth's crust. All of the native or natural silicates smelt like glass under high temperatures, and glass as well as the glazes of chinaware, earthenware, tiles, etc., are artificially prepared silicates. Waterglass is employed in many industries. In painting it is used in stereochromy (mineral painting), where it is the medium or binding vehicle for application of the colors directly upon the wet mortar. It is also employed as a size to porous surfaces, such as plaster casts, etc. In acid-proof preparations, mixed with asbestos, it is invaluable, also in preparing quick hardening cements and putties. It is used in soap manufacture, in impregnating stone against decay, in lining the inside of wooden casks, where glue is undesirable, and has numerous other uses. It is usually sold by the degree of consistency, but when put into use it is reduced to 3 deg. Be. for easy spreading.

—1779—

Paint for the Inside of Incandescent Lamp Tin Shades.

The manufacturers of the paint do not take us into their confidence, but it is a certainty that if white lead or only part white were used in this connection the inside of the shades would turn yellow in a few hours. Zinc oxide or a mixture of zinc oxide and barytes is undoubtedly the pigment employed and the only material that will remain white for a time. Nor can there be much, if any, linseed oil in such paint.

—1780—

Quantity of Oxalic Acid Crystals Required to Produce a Saturated Solution.

When you find a recipe where oxalic acid is mentioned as one of the ingredients you will usually find that water is also part of the formula. When oxalic acid is suggested as a bleaching agent or as a cleaning agent, a saturated solution oxalic acid in water is indicated. A saturated solution of any chemical means that the crystal or powder, whatever it may be, is to be dissolved in as much water as will hold the chemical in solution without sediment. To satisfy

one's self that the solution is actually saturated, the clear liquor should be decanted from the precipitate formed by an excess of the chemical. If chemically pure one ounce of oxalic acid to one pint of water will be sufficiently strong for bleaching, but it will require two ounces of the crystals to one pint of water for a saturated solution. The water should be hot so as to act more rapidly in dissolving the crystals and if on cooling after frequent stirring a precipitate is found in the bottom of the vessel, it is evidence that the solution is full strength.

—1781—

Method for Softening Sponges That Become Hard After Drying.

Water containing chlorine or chlorides in any form and lime water will make sponges hard, no matter how well they may be washed and wrung out before drying. Certain soaps will do the same, unless the sponges are freed from any remaining traces by washing them several times in soft, tepid water.

A simple method to soften sponges is to saturate them in buttermilk for twenty-four hours, then wring them out and rub briskly between the hands, then rinse in luke warm water and allow to dry. This will not only soften but bleach them also. Another method is to first wash the sponges in tepid water, then squeeze out the water and wash again in a solution of five fluid drachms of hydrochloric acid to seven pints of water, which frees the pores of the sponges from carbonate of lime; then immerse the sponges for twenty-four hours in a solution of five parts by weight of hydrochloric acid in 100 parts by weight of water, to which has been added six parts by weight of hyposulphite of soda. This immersion will also bleach the sponges as well, but if not desirable, the immersion can be dispensed with.

—1782—

Waterproofing an Old Canvas Tent.

We presume that you do not want to go to much trouble or expense in waterproofing old canvas. The cheapest method is to dissolve equal parts by weight of gelatine or white glue and chrome alum separately, the former by melting in the usual way, the latter in hot water, mixing the two solutions, while still fairly warm, applying several coats of the mixture to the canvas with a brush of suitable size. But as the mixture solidifies on standing about and cannot be made liquid again, it is inadvisable to make up more at one time than is sufficient for one coat.

—1783—

Fireproofing Cotton Cloth.

K. S. Co., New York, desire to know of some preparation by which cotton goods can be prevented from burning.

We do not know of any firm manufacturing such a preparation, but the following formula is good for the purpose:—Six pounds chemically pure sulphate of ammonia, $\frac{3}{4}$ pound chemically pure phosphate of ammonia, dissolved in 5 gallons of tepid water. The solution must be kept covered when not in use and stirred frequently while using. It should be made frequently, as it loses strength on long standing. As this is soluble in water the fire resisting properties will be removed if the fabrics are washed.

—1784—

Restoring the Finish of Linoleum.

A dressing for linoleum can be made as follows:—Melt in a water bath (in a double receptacle such as is used for dissolving or melting glue) one ounce of yellow beeswax and two ounces carnauba wax, take from the fire and stir into

the melted wax first 10 ounces turpentine and then 10 ounces benzine. Keep stirring until cold, then apply with a cloth and polish. To restore the gloss on linoleum, floor varnish is not advisable, as it will crack in a short time and it will not wear at any rate. Rub over the cloth a mixture of say one-half pint each of paraffine oil and palm oil, thinned with two pints high test kerosene oil. Let this remain a while, then go over it with a dry soft cloth.

—1785—

Transferring Pictures of Any Kind to Glass.

Prepare a solution of nitric acid in water, using 1 per cent. of acid to 99 per cent. of soft water, if the paper is very thin, such as newspaper, if the paper be medium weight, use 2 per cent. acid, if heavy paper, well sized, as much as 3 per cent. acid. Lay your print face down on a sheet of manila paper, which is larger than your picture and with a sponge apply the solution to the back of the picture, but so as only to moisten the paper, not to soak it. Keep on sponging lightly until printing is to be seen plainly and the paper is quite transparent, then stop sponging. Have your glass ready by first cleaning it with a ball of cotton saturated with alcohol, dry it well, then wash with turpentine and dry it off again, place it on a table on an elastic pad of heavy flannel or rubber blanket. Now coat the glass with a mixture of equal parts white damar varnish and turps, let this set until it retains a slight tack only. Lay the impression of the picture face downward upon the glass plate, but be careful that neither acid or water touches the print during the entire process. To properly lay down the impression, take it up with both hands by holding the left hand under the lower left hand corner, and with the right hand hold the upper right hand corner, and be careful not to get any air bubbles under the sheet. Mark on the plate the exact position and size of sheet. In laying the print on the glass plate, adjust first the upper right hand corner to the mark, holding with your finger tip, then adjust the lower left hand corner, but avoid air bubbles. Press the sheet down on the coat of damar and turpentine coating and repeat the pressing until all is smooth, then fan it dry, and then, with wet finger tips, carefully and slowly rub off the paper, leaving only the print on the glass.

If you observe these directions carefully, you can remove every vestige of paper and the printing will stand out clear on the glass. Upon this apply another coat of white damar varnish, but do not add turpentine in this case, as too much turpentine is liable to soften the first coat and remove all or part of the print.

—1786—

Removing Water Stains from Pigskin Leather.

The only remedy we know of is the following process, which we give for what it may be worth, but cannot guarantee results:—Mix one pound French yellow ocher and one tablespoonful of olive oil, then add one pound pipe clay (powdered china clay or kaolin) and one-quarter pound starch. Mix all with boiling water to the consistency of paperhangers' starch, beat it until all lumps have disappeared. When cooled, lay it on the leather with a brush and allow to dry, then brush and rub well. If this process removes the stain, you can brighten up the leather with the proper dressing.

—1787—

Cementing Leather to Sheet Iron or Heavy Tin.

Clean the surface and roughen it some with emery cloth or sandpaper, then coat it with white lead or lampblack in oil, so thinned with turpentine and japan drier that it will dry flat or at most with eggshell gloss. While the paint is drying melt in a water bath with vinegar some good glue that has been previously

soaked in cold water. This liquid glue should have the consistency of varnish and while still in the water bath, but not on an open fire, add to it while stirring one-third as much thick or white turpentine as you have of the glue and vinegar solution. While the mass is still warm it is applied to the iron or tin surface over the paint and the leather is pressed down upon it and smoothed out from the center towards the edges with pressure. This glue or cement may be put into wide mouthed jars, corked air tight, where it will keep for a long time. Before using it, the jar is placed in warm water and cork removed before it becomes too hot.

—1788—

Chemical Ink for Glass Bottles.

An approved recipe for such a writing fluid or ink is as follows:—Dissolve 10 grammes shellac in 75 cubic centimeters of alcohol and warm it some, with caution. At the same time dissolve 18 grammes borax in 125 cubic centimeters of water by heat and add slowly while stirring the alcoholic solution of shellac. When the two solutions are well mixed add 0.5 grammes methylviolet, which makes a red ink that will not be destroyed by acids.

A still better method for marking glass bottles is the following:—Mix 35 grammes sodium fluoride, 7 grammes potassium sulphate and 500 cubic centimeters distilled water. Also mix 14 grammes of ohloride of tin with 500 cubic centimeters of distilled water and add 65 cubic centimeters hydrochloric acid. Finally mix the two solutions in a gutta-percha flask or in a porcelain vessel that has first been lined with a thick coating of paraffine wax. To write with this on glass use a goose quill pen and within thirty minutes the writing is etched on the glass.

—1789—

Colored Inks for Rubber Stamp Pads.

To prepare colored inks for inking pads for rubber stamps.

Aniline colors that are soluble in alcohol are the proper coloring matter. Dissolve one-eighth ounce of dry aniline color of the desired shade in one fluid ounce of 95 per cent. denatured alcohol and add one fluid ounce of refined glycerine and bottle for use. Should it become thick in time add more alcohol and glycerine, in equal portions by measure. For black take nigrosene B., for red take fuchsine, eosine or ponceau, for blue take night blue, for violet take methylviolet, for brown use acid brown, for green take brilliant green. Should the ink in the proportions given be too intense, add more glycerine. These inks will also serve for saturating the ribbons of typewriters, as well as for the inking pads for metallic stamps.

—1790—

Handling and Storing Kerosene Safely.

It is impossible to render kerosene harmless as to fire risks without destroying its illuminating power. The only safeguards are not to handle any kerosene with a lower flash point than 150 degrees, and to keep it in as low a temperature as possible; also avoid handling it in proximity to an open flame. If stored in well-sealed cans or in steel drums it is fairly safe to handle.

—1791—

Permanent Marking Ink for Laundry.

The following recipe has been given us by a chemist as the very best that can be produced:—Five grammes of copper sulphate (blue vitriol), and two grammes of nitrate of silver are dissolved in 10 grammes of spirits of sal-ammoniac and 1.5 grammes soda. One gram of nigrosin B, soluble in water is dissolved in 10 grammes of soft water and both solutions are mixed. Finally 10 grammes of liquid glucose (glucose syrup) is added, the resulting ink bottled and well corked.

—1792—

To Soften Rubber That Has Become Hard.

Place the type, if small, in a mixture of two parts cold water and one part ammonia until softened. If the type is large and thick in form place in a vessel with cold water and bring the latter to a boil on a slow fire. Then dry each type with a soft cloth and put in a warm place to dry thoroughly.

—1793—

To Make Corks Acid and Alkali Proof.

Prepare a solution of 20 parts by weight of gelatine and add 1 part by weight of glycerine. Heat the solution to 112 degrees F., place the corks in this and let them soak for about thirty minutes, then remove and wash them in lukewarm water and let them dry thoroughly. Now mix 2 parts by weight of vaseline and 7 parts by weight of paraffine, bring it to a temperature of 100 degrees F., and steep the corks in this bath, leaving them remain ten to fifteen minutes. The corks are now proof against acid and alkali or any liquid as long as such liquid is not a solvent for vaseline or paraffine, such as ether, alcohol, benzol, benzine, fusel oil and the like.

—1794—

Preparing Colored Chalk in Sticks for Cartoon Work.

To prepare colored chalk in fingers or sticks for cartoon work, that is, what materials to use and what kind of binder.

What you have in view are crayons for drawing on paper, similar to the colored chalk sticks used in schools. There are various ways for preparing these, but we shall describe here the simplest method of preparation. The color and body substance is mixed into a fairly stiff paste, which is placed into a cylinder of two or three inches diameter, one end of which is firmly attached to a perforated plate, the holes in which are of the diameter of the crayons desired. The paste in the cylinder is then pressed down by means of a tight fitting plug or piston and the pieces that pass through the holes in the perforated plate are cut into the proper length, placed on trays and dried in a slow oven.

To work properly the base and coloring substances must be impalpably fine and free from all grit. If you cannot procure the pigments fine enough you can wash them over until the grit is eliminated. For the base you may take equal parts pipe clay (kaolin) and fine prepared chalk, adding sufficient coloring matter, making the stiff paste by mixing with pale mild ale, or you may take washed pipe clay and color alone, omitting the chalk. Another paste may be made by mixing equal parts washed pipe clay and washed chalk with sweet ale, that has been made hot and in which a chip or two of isinglass has been dissolved.

For coloring matter lampblack or ivory black will suit for black, graphite for gray; indigo, Prussian blue or ultramarine for blue; Turkey burnt umber for dark brown, yellow ocher and burnt sienna for light brown, chrome yellow and Prussian blue for green, orange mineral for light red, carmine substitute for dark red, carmine substitute and ultramarine for purple and medium chrome yellow for yellow.

—1795—

The Manufacture of Sand and Flint Paper.

Kindly let me have some information regarding sandpaper. How early was it used and by whom? How manufactured?

We have no data at hand as to how early and by whom sandpaper was first used, but are informed that the glue manufacturers, Baeder-Adamson & Co., of

Allegheny avenue and Richmond street, Philadelphia, entered into the manufacture of sand and flint paper as early as 1856, when they erected a plant for that purpose and placed their product on the market early in 1857. Whether there was any sandpaper manufactured in this country prior to that time we are unable to say at present, but would thank any of our readers to advise us. Flint paper is much harder than the ordinary sandpaper, and its cost runs about twenty-five per cent. higher. Both come in eight grades of fineness from 00 to No. 3, the latter being coarsest. As to the process of manufacture it has like that of most all other commodities been somewhat modernized. The flint or sand, as the case may be, is carefully washed, then crushed in edge-runner mills and finally bolted through cylindrical shaped wire cloth of proper mesh and then dusted on to the paper which has been given a coat of thin glue size on one side, the surplus of flint or sand being knocked off the paper by a device installed for the purpose. Glass paper was made in a similar manner, the difference being that glass from broken bottles or other glassware was crushed in place of flint or sand. Emery paper also undergoes a similar process, but is put up in only six grades of fineness. In preparing emery cloth the cloth is also covered with glue size on one side and the emery sifted thereon, according to fineness desired.

—1796—

Composition for Picture Frames.

A. K. S., New York city, writes:—A good formula wanted for making composition, such as is used by frame-makers for the scrolls, etc., one that is pliable enough to be worked and that will set hard enough to gild next day. Understand these compositions are made of glue, rosin, pitch, linseed oil, water, plaster of paris, whiting and clay. This looks to be as having too great a variety of ingredients.

Your information is correct insofar as these ingredients enter into the composition, but not necessarily all of them need to be used in one and the same formula. The simplest composition we know of is made as follows:—Dissolve one pound white glue in one gallon of water in a water bath, so that it will not be burned. In another kettle place two pounds powdered rosin, of the pale variety; one-quarter pint Venice turpentine and one pint of linseed oil. When the rosin is melted pour the contents of this kettle into that containing the glue solution, or vice versa, and continue to boil, while stirring the whole mass, until the water has disappeared through evaporation. Now, add enough bolted gilder's whiting until the mass becomes of the consistency of soft putty, when it can be pressed into molds, that have been greased with olive oil. When cold, the composition will be hard enough to gild. Any portion of the composition left over, or which may have become too cold to use, may be warmed and made soft again.

Another composition that becomes very hard on drying is made by dissolving one pound of glue in one quart of water, stirring into this five pounds bolted gilder's whiting and one-quarter pint Venice turpentine, while the glue solution is fairly warm. If all the whiting is not taken up by the solution, add enough hot water until the consistency of soft putty is attained. This may be pressed in molds as above or kneaded into any shape, while warm, but we should prefer the first formula as being less brittle.

—1797—

New Medium for Tempera-Painting of Pictures.

New medium for tempera-painting pictures of art, to be used in place of egg-yolk emulsion or prepared white of egg.

A few years ago an artist named Karl Lupus, of Munich, obtained a patent in Germany for the preparation of a medium or binder for artists' colors. The letters patent are to protect his invention of a medium composed of a mixture of egg-yolk and a drying oil, that may be used as a binder for artists' colors, or when mixed with resins, as a medium or finishing varnish for paintings in tem-

pera. The preparation consists of the intimate mixing of approximately equal parts by weight of egg-yolk with drying oil, which mixture is then, while constantly agitated, heated to a temperature of between 120 degrees and 130 degrees Fahrenheit, and kept at such temperature until the egg-yolk has lost about one-half its weight of water.

It is claimed by the inventor that this medium unites the excellent properties of the egg-yolk tempera medium with those of pure drying oil. This new medium imparts to the colors a similar tractability to that which they exhibit with egg-yolk, but has the great advantage of conserving the colors in the tubes far better, and that the colors undergo no change when varnished.

It is a well-known fact that egg-yolk under ordinary conditions will take up but very little drying oil for the emulsion. But it has been discovered by the inventor that by partly expelling the water contained in the egg-yolk the latter will absorb a great deal more oil. The water, however, must not be expelled until egg-yolk and oil have been well beaten, otherwise a thorough union of the ingredients is impossible. The process is best carried out as follows:—100 parts by weight of egg-yolk and 75 parts by weight of poppyseed oil, clarified by age, are well mulled on the slab; then the slab is heated gradually to 120 degrees or 130 degrees Fahrenheit, and the mulling continued until the weight of 175 parts of the mixture has been reduced to about 125 or 130 parts. The mass, which, on cooling, should be like soft butter, is now ready for use, and acts as the binder. ing, which causes them to show great translucency in the transparent colors. The dry colors require more of this binder than they do of straight oil for grinding. When this new binder is used as the thinning medium, or vehicle, it is best to mix with it a portion, say equal parts of mastic varnish (gum mastic dissolved in spirits turpentine). It is further recommended to add about 3 per cent. of this medium to the mastic varnish, when using it for finishing a picture. The tempera colors, prepared with this medium as a binder, are not miscible with water, and in this respect they differ materially from any other known tempera colors. As far as the grounds are concerned, this new medium does not require any change to be made in them.

—1798—

Transferring Pictures to Paper or Glass.

How can pictures be transferred from one paper to another or to glass?

We are not clear as to what kind of pictures you have in view. If you refer to engravings we can suggest the following method for transferring on white paper:—Hold the engraving for a few seconds over the vapors of iodine. Then dip the white paper required to receive the engraving in a weak solution of starch and when dry in a weak solution of oil of vitriol. When again dry, lay it upon the engraving and place both, for a few minutes, under a press, when the engraving will be reproduced in every detail of finish. Colored pictures require a different treatment. To transfer engravings, pictures or prints from paper to glass the following process is said to be best:—Place the picture, etc., face downward upon a large sheet of manila paper. Prepare a solution of from one to three per cent. of nitric acid, according to thickness or strength of paper and how strong it was sized; ordinary thin paper requiring even less nitric acid than one per cent., the object of the latter being to remove the size. Apply this solution with a sponge to the back of the picture or design to be transferred, but do not soak it, as you only want to render the paper soft. Sponge it only until the picture or design shows plainly through the paper. Have your glass thoroughly cleaned with alcohol, using a ball of cotton, dry it off well and wash with turpentine, dry off again and lay it on a piece of flannel and with this under it, on a table, or still better on a rubber blanket, under a litho handpress. Now coat the surface of the glass with a mixture of equal parts damar varnish and turpentine and let it partly dry, and while still slightly tacky, lay your object face downward upon the glass, taking care that no moisture comes in contact with either glass or paper. It is best to mark on the glass the exact position and size of sheet, holding the lower left corner with the left hand, and the upper

right corner with the right hand. Be careful to avoid bubbles in smoothing the paper down on the varnish coat and fan it perfectly dry, and then with wet finger tips rub off the paper. When every vestige of paper is removed and the paint or design well fixed, apply a flowing coat of damar varnish of good body, but do not brush it, otherwise you may rub off the entire picture from the plate.

—1799—

Flatting Medium for Photographic Backgrounds.

Formula asked for flatting oil for photographic backgrounds.

We do not know of any flatting oil for use in photographic backgrounds. If you wish it for coating canvas cloth we suggest the following liquid:—Melt in one gallon of water one-half pound of ordinary gelatine and add two ounces of syrup. Beat up one-quarter pound fine whiting to a thin paste with part of the liquid, adding it to the total. Do not stretch the cloth, as it will shrink on applying the whiting and liquid size, of which two or three coats should be given. When dry, sandpaper until smooth, then give one coat of flat oil paint, made from white lead ground in oil and tinted with part-dry lampblack and lampblack ground in oil thinned with pure spirits of turpentine. The tint should be a very dark lead color. One coat of flatting is then put on by two persons, one to paint and the other to dab with a soft brush. The flatting consists of drop black, ground in japan, thinned with spirits of turpentine.

—1800—

Size for Rugs and Carpets and Kindred Fabrics.

The best backing or size we know of for the purpose and which will stiffen the rugs or carpet without making the fabric brittle, may be made by mixing thirteen parts by weight of kaolin (china clay) powdered and seven parts by weight of calcium sulphate (gypsum) with enough glycerine to make a soft batter, which is applied to the under side. In place of the gypsum starch may be used, but in this case the mixture should be warmed.

—1801—

Measuring Galvanized Iron Cornices.

Galvanized iron cornices are measured in a similar way to those made of wood, i. e., measure the entire length all around the building, so far as the cornice extends, using the tape line; then measure the width, following panels and moldings, multiply the length by the width, which will give you the number of square feet or square yards. Add to this fifty per cent. for the trouble of reaching it, and should there be any brackets or other ornaments you will have to use your judgment in adding to your estimate. At all events, it is necessary to use discretion in estimating, as the difficulty of reaching certain work cuts a big figure in the cost of a job. But no matter how plain a cornice may be, the rule is to add fifty per cent. after figuring on the amount of surface to be painted.

—1802—

Blackening for Leather in Harness Making.

Prepare the blackening by dissolving gum shellac in a solution of borax in water and adding carbon black or soluble nigrosene. When cold, denatured alcohol is added to give flowing consistency and proper penetration. The following formula is vouched for as having given excellent results. In a copper kettle or enameled kettle place five gallons of water and two pounds of pulverized borax and heat this until the borax is dissolved, then while keeping up the boil-

ing add gradually thirteen pounds gum shellac V. S. O. or D. C. grade and allow to cool, when all the shellac has gone into solution. Then skim off the waxy substance that floats on top of the mass and add three pounds of alcohol soluble nigrosene black that has been dissolved in denatured alcohol, enough of which must be used to produce a perfect solution (without leaving a residue). The mass is well stirred and thinned with enough denatured alcohol to make it nearly as thin as water. The process of dissolving the shellac must not be carried on in any iron kettle, as this would produce undue thickening or lumpiness. Denatured alcohol is suggested because pure grain alcohol is too high in price because of the tax imposed upon it, while wood alcohol is too pungent in odor and rather severe on sensitive eyes.

—1803—

Laying Out the Stripes on a Barber's Pole.

Paint the pole first with the ground color, which may be white or light yellow. Have this nearly flat or dead flat, then place a sprig or tack at top of pole, under the head piece, whatever that may be, and fasten to this the end of a long piece of thin cord. Determine the width of the stripe as it best suits the height and diameter of pole and place another piece of cord at the proper distance below the first one, fastening it in a similar manner. Now rub some pouncing black or red chalk on the two cords, then pass the first cord about the pole in a winding manner like a spiral screw, following with the second cord in a like manner, taking care to keep it parallel with the first cord. This will give you the outlines for the stripes that you can fill in with the desired colors.

—1804—

Dressing for Leather on Upholstered Furniture.

If you simply wish to soften and preserve the leather, there is nothing better for the purpose than pure castor oil, and you do not need the refined article either. Commercial, or what is known as No. 3, will serve the purpose. It only requires to be applied with a piece of soft cloth and should be rubbed in well. When it has been absorbed by the leather it should be rubbed over with a piece of dry cloth, free from lint, until it has lost all stockiness, so as to keep clothes coming in contact with the leather from being soiled. It is best, when the leather is rather hard, to give several applications of the oil at intervals of ten days or two weeks. A formula for a leather preservative, that will also restore it almost equal to new, is to melt in one receptacle 20 parts by weight of pure yellow beeswax, adding one part of powdered borax while melting, thus forming a jelly. In another receptacle is melted 7 parts of spermaceti, to which is added while on the water bath 5 parts copal varnish, thinned with 10 parts spirits of turpentine. Then mix the wax jelly and the melted spermaceti and varnish together, finally thinning with 57 parts more of turpentine. The melting must be done on the steam bath, on account of the fire risk. If desired, in order to hide worn spots, the preservative may be colored with fat analine colors, that can be dissolved in turpentine before it is used for thinning the melted wax and spermaceti mixture. The preservative may be kept in tins, similar to shoe polish and should be applied to the leather with a cloth and rubbed over with a soft brush. After several applications once a week the leather will look good as new, and the process does not require repetition for a long period.

—1805—

Cleaning Pig Skins Soiled by Grease, Etc.

We should say that the very best method would be to treat the pigskin in the same way as vellum is cleaned. It consists in saturating a sponge with petroleum spirit (benzine) and rubbing it over the skins, squeeze out the sponge

and use clean benzine, going over the skins again and again until all stains have disappeared. When dry, you can make it look bright and smooth by dipping a soft cloth lightly into kerosene and going over the skin with it.

—1806—

Painters' Cream for Oil Paintings.

Composition of the material known as Painters' Cream that is used by artists temporarily to cover oil paintings and can be washed off at will, when desired.

The only formula we know of is to mix and triturate one and one-half pounds bleached walnut or poppy seed oil, preferably the former, one-quarter pound gum mastic, finely pulverized, and one ounce white sugar of lead that has been ground fine in oil, in paste form, as it is sold to artists in tubes. When this mixture has been well beaten up, forming a uniform mass, add water slowly until it is the consistency of thick cream.

—1807—

Slow Drying Solvents for Aniline Dyes.

What will mix with aniline dyes that will retard their drying?

Aniline dyes will dissolve readily in pure glycerine, and the resulting mixture can be diluted with water, or water and alcohol, and in this way the setting of the color or dye is more or less retarded. If the stain so made sets too slowly the dye may be first dissolved in strong alcohol, and then diluted with water and the glycerine added last.

The fat or oil soluble aniline colors or dyes can be dissolved in any oil, as well as in spirits of turpentine or turpentine substitute, in petroleum naphtha, and also in solvent naphtha or coal-tar benzol. When benzine is used the quick evaporation or setting can be retarded by using one-third of the total of solvent naphtha.

—1808—

Painting Farm Implements by the Dipping Process.

Method of painting farm implements by the dipping process and formula for making the dipping paint.

For over twenty years past the manufacturers of agricultural implements have followed one general plan whenever they adopted the process of painting by dipping, although in some instances a few factories still adhere to applying the paint with the brush on some of their work and find it more economical. Previous to the time above mentioned the manufacturers had considerable trouble in obtaining paints that would keep well in suspension, and there was quite a lot of waste on account of sediment in the dipping vats or tanks. A genius with mechanical ideas induced a few implement makers to install dipping tanks of his make, telling them that they would only have to purchase the dry pigments and the liquids, place them in the tanks, turn on the power which would turn the revolving shaft provided with blades in the bottom of the tank and thus make the paint ready for immediate use. The plan did not work, because it is necessary to grind the dry pigments in oil, japan, etc., to a fine paste before thinning it to the proper consistency for dipping. Our friend whose name is well known to the implement trade, as well as to paint makers, then took another course, and because the implement people would not purchase his apparatus, he forthwith manufactured dipping paint in paste form, selling along with this a liquid for reducing the paste to the right consistency for dipping. At the same time he furnished his tanks free of charge on the implement makers signing contracts to purchase a certain quantity of the material from his concern within so many seasons, after which time the apparatus belonged to the implement

concern that permitted it to be installed originally. With the knowledge possessed by practical paint manufacturers today, it is unnecessary to use a revolving shaft with blades in a dipping tank and really better economy to do without it, because the continued stirring causes too much evaporation of the volatile thinners, without which a dipping paint cannot be made. These paints can now be made so that on standing for a time undisturbed there will be no hard sediment in the bottom of the vat or tank; it requiring only an intimate knowledge of the characteristics of the materials used. Not knowing your requirements we cannot give you any formula for such paints, and to publish a number of formulas for dipping paints our space in these columns is limited. Nor do we know of any publication on the subject that we could recommend. However, we should say that it will not pay you to install a grinding plant for grinding the pastes necessary for the dipping paint, as there are any number of paint manufacturers who can furnish these at moderate prices, and you need not be afraid in the face of the keen competition that you will have to pay more than the goods are actually worth. You can obtain pastes in almost any color and shade that contain the required binder and driers, and all you need to do is to thin certain quantities of the paste or pastes with petroleum naphtha (benzine), dip into this the parts of implements to be painted and set them aside to dry, after which you can finish them in varnish, either applied by brush or dipped. Certain parts of implements, especially those of metal, such as plowshares, harrow blades, can be finished in one operation with color and varnish. When color and varnish are employed for dipping purposes it stands to reason that the latter must flow and drip freely, and in order to have it do so the varnish must not be overloaded by the color, therefore only the very strongest colors are admissible.

—1809—

Manufacturing Black and Colored Crayons.

The so-called black chalk crayons for marking on paper, wood, etc., are made, we understand, in pretty much the same way as the graphite lead pencils—that is, well calcined lampblack is mixed in a power mixing machine with finest floated kaolin intimately, then pressed in sticks that are first air dried and then calcined in a special furnace without admission of air.

Ink crayons are mixtures of finest graphite, aniline (nigrosene) and finest floated kaolin in water. The proportions of the ingredients differ according to the hardness desired, the hardest containing the most kaolin. These sticks are formed under high pressure and are first dried in rooms at ordinary temperature and finally in the open air. Colored ink crayons are made by mixing kaolin only in water, adding water soluble aniline colors, such as eosine, methylblue, methyl-violet, etc. These are also formed into thin sticks, pressed and dried as is the black. Ordinary colored crayons that are sold for marking consist of a mixture of kaolin and various earthy or metallic pigments, such as redde, soot, Prussian and ultramarine blue, red lead, etc., also some chalk and the binder consists of wax, gum thus and tallow and soap. In this process the clay, chalk and pigment colors are intimately mixed with a watery emulsion of wax, tallow and soap, and probably gum thus (thick turpentine), and the mass formed into sticks by pressing into wooden forms that have been greased to keep the crayons from sticking. There are some other forms of crayons for marking on glass, etc., but the foregoing answers your question.

—1810—

What Do We Understand by Crude Oil?

The crude oil that is used quite frequently by wood finishers in rubbing varnished surfaces with pumice stone is the first run when petroleum is refined by distillation. It is not as heavy in specific gravity as the later runs, when it is divided by further distillation into kerosene and heavy lubricating oils. This crude oil may be considered a crude naphtha of a specific gravity of .74 to .76,

that contains kerosene, rhizolene, etc. In refining and distilling, these bodies are separated, and by further treatment the important volatile liquids, benzine, gasoline, etc., are obtained.

While it is generally understood in our trade that by crude oil we mean the product just described, there is another material, also known as crude oil, and unless the word "tar" is mentioned in connection therewith it may lead to misunderstandings. This material is a product obtained by distillation of coal tar, generally from bituminous coal. The tar is obtained from the coal by dry distillation in suitable retorts, the other product from this process being coke. The tar is first washed with dilute sulphuric acid, in order to remove basic ingredients, and then distilled in cast-iron apparatus under low pressure or steam vapors. This first product of distillation is known as crude oil of tar. Further distillation removes from tar the numerous products, creosote, carbolic acid, solvent naphtha, benzol, hylol, etc.

—1811—

Bleaching with Fuller's Earth.

The oil is placed in large tanks that are heated either by steam jackets or steam coil, and provided with a stirring device driven by machinery. From 10 to 15 per cent. of the weight of the oil of finest fuller's earth is introduced and the whole well stirred for a few hours, while the oil is kept at a temperature of not less than 170 deg. nor over 200 deg. After resting from twenty-four to forty-eight hours the oil is put through filter presses and is thus freed from impurities as well as from most of the discoloring agencies that are natural with raw linseed oil, but, of course, it is not as colorless as the sun-bleached oil.

—1812—

Bleaching with Hydrochloric Acid, Manganese Dioxide and Bichromate of Potash.

In a lead lined tank of 100 gallons capacity, provided with stirring device, 70 gallons raw linseed oil are placed, and while stirring, 50 pounds hydrochloric acid of commercial strength are added. After stirring one hour, 20 pounds bichromate of potash, dissolved in five gallons hot water, is added and then five pounds of finest pulverized manganese dioxide of high percentage is sprinkled in on the mass and the whole stirred four or five hours longer and then left standing forty-eight hours. Then the oil is drawn off into another tank to be freed from the acid by washing and either filtered or cleared by settling.

—1813—

Bleaching with Hydrochloric Acid and Manganese Dioxide.

This is done in the same manner and in similar proportions, with the exception that bichromate of potash solution is omitted. The bleaching of the oil by this method is accomplished by the action of the chlorine, which is liberated from the acid on the disintegration of the manganese and which destroys the substances that discolor the oil.

—1814—

Bleaching with Permanganate of Potash, Sodium Sulphite and Hydrochloric Acid.

Thirty gallons raw linseed oil are placed in the tank or lead lined tub, and while stirring four pounds permanganate of potash, dissolved in ten gallons of water, are added. When mixed let stand twenty-four hours and then six pounds sodium sulphite in powder are added, and when this is dissolved

eight pounds crude hydrochloric acid. It is stirred well, and when the mass which was brown at first, takes on a paler color, then the mixture is washed with warm water to which bolted whiting has been added, until the water does not show any more acid reaction by the litmus paper test. Finally the washed oil is filtered through dehydrated sodium sulphate (Glauber's salt).

—1815—

Bleaching with Permanganate of Potash and Hydrochloric Acid.

In a lead lined tank, place, say, thirty gallons raw linseed oil and add six pounds permanganate of potash that has been dissolved in three gallons of water. The mixture is stirred for one hour, then allowed to rest for forty-eight hours and only stirred occasionally. After this time, while the mixture is being well stirred, twelve pounds hydrochloric acid of 20 deg. Be. spec. gravity is added and the whole stirred for one hour, then permitted to rest for twenty-four hours, only stirring occasionally for a minute or so. After this the oil is drawn off into a wooden barrel or tank and the excessive acid washed out with hot water, after which the water is drawn off and the oil put through a filter press, or through a filter bag, to free it from impurities. In order to make this oil dry well it should be placed for forty-eight hours in flat iron kettles or pans and exposed to warm dry air at a temperature of from 100 to 120 deg. F.

—1816—

Imitation of Sandstone on Wooden or Metal Surfaces.

Best method of producing a sanded surface in imitation of sandstone on wood and iron. Is there any real advantage in sanding paint?

The sand is applied to the fresh paint with a sanding appliance consisting of a pair of bellows of wedge-shaped form. The sand must be of an even, fine mesh, and may consist of ground sandstone or other sharp sand of light color, but in any case it must be dry. The paint must be a good, fairly stout linseed oil paint of the color of the stone it is desired to imitate, and the sand must be blown on the surface while the paint has not yet set, so that it will adhere well. If the paint is of good weatherproof quality the sand will give still greater resistance to atmospheric influences. As pigments only mineral or earth colors, such as yellow ochre, red oxide, umbers and siennas and mineral black, should be considered.

—1817—

Mordant for Water Glass Against Water.

Is there such a material (and what is its name) that will act as a mordant against water that is being applied to water glass, when it has set dry and hard?

The term mordant is misapplied here, inasmuch as a mordant is a substance which attracts coloring matter to organic fibers or to mineral substances, and the term can really be applied only in dyeing and calico printing and in the manufacture of colors. Hence we do not understand question fully. Water glass, when dried hard, is not affected to any extent by clear water, unless the water remains in contact with the coating for a long time; mere dashing of water against the coating will not remove it when once fixed. There are two forms of water glass, one form being silicate of potash, the other silicate of soda. Both are white salts that melt like glass under white heat, but are soluble in water, hence the common term water glass. All the salts of silicic acid known as silicates, with the exception of those combined with an alkali salt, such as soda or potash, are insoluble in water. When water glass is mixed with any acid, however, even in dilute solution, the silicic acid separates and precipitates in the form of a brittle, jelly-like mass, which is insoluble in water. Therefore, when water glass is employed to impregnate acid carboy boxes against

taking fire on the breaking of the glass carboys, it is reinforced by adding powdered asbestos. If your aim is to make water glass more resistant to water, you may try the addition of hydrate of magnesia or a combination of aluminum hydrate and hydrate of silica. Rubber or resinous substances would simply thicken the water glass to an unworkable mass, and on further dilution the water glass would lose its properties to such an extent that it would be of no value whatsoever.

—1818—

Burnishing Clay—Its Properties and Uses.

What is generally known as 'Burnishing Clay' is the finest kaolin or pipe clay, and must be entirely free from grit of any kind. It is generally used in making burnishing powder, that known as "Belgian" being composed of 24 parts, by weight, of pipe clay, 4 parts finest chalk, 16 parts dry lead, 6 parts magnesium carbonate, and 6 parts Crocus.

—1819—

Coloring for Black Celluloid Buttons.

One method and probably the most simple one is to dissolve nigrosene black in the proper solvent or medium for celluloid. When amylacetate, amylacetone or sulphuric ether is used as the solvent, the black to be used must be the spirit soluble nigrosene, a coal-tar dye known under that name, that may be obtained from any dealer in aniline dyes. In order to economize, the solvents referred to may be mixed with methyl-alcohol or denatured alcohol to a certain point, that must be determined by practice.

The articles of celluloid, whatever they may consist of, are dipped or immersed in this colored solution, which softens the celluloid mass and in this condition the latter absorbs the coloring. This process will require anywhere from ten to twenty minutes, but should not take longer, because it would then dissolve the celluloid as well. When so colored, and when again exposed to the air, the softened celluloid articles will rapidly harden again.

Another process to permanently dye articles of celluloid is to dip them into a weak solution of soda lye, while the latter is boiling, and then into a weak solution of silver nitrate, permitting the articles to dry in the sunlight, which, by its action on the silver nitrate, produces the black effect. Other color effects on articles of celluloid may be had by using in the amylacetate solution spirit soluble anilines of the color desired, proceeding in the same manner as with the black.

—1820—

Hardening Plaster Casts or Ornaments.

There are several methods to accomplish this, but the cheapest and most simple method is to use a saturated solution of sulphate of soda (Glauber's salt). The solution is made by dissolving enough of the salt in clear water, so that an excess of the salt remains in the form of crystals in the bottom of the vessel used for making the solution. If the plaster cast is not only to be hard, but should also harden more quickly than when the plaster is mixed simply with water; the solution referred to is used in place of clear water in making the form. But when the time permits and quick hardening is undesirable, then the cast or ornament is prepared in the usual manner, and when finished laid in the solution referred to until thoroughly saturated. When the size of the article precludes the immersion in the solution, or when it is desired to harden plastered walls and ceilings, the surface is coated by means of a kalsomine brush, as often as it still absorbs the solution. If it is desired to have the plaster casts or surface not only hard, but also tough, the plaster is mixed with a thin gelatine or glue size in place of clear water. By combining the two methods, the plaster will be

tough and hard at the same time. In place of the sulphate of soda solution, a saturated solution of zinc sulphate may be used, but this is much more expensive. Alum has also been recommended, but it has been found that it will not stand contact with water when the articles are to be polished. A treatment that will make plaster casts as hard, and even less porous, than marble, is as follows:—The casts, after being made into the form desired, are heated in an oven at no less than 212° nor more than 300° F., so as to drive off the water, or at least the greatest portion of water used in mixing the plaster, when they are placed in a solution of barium hydrate, which must have a temperature of not less than 100° F., and permitted to remain there for some time, according to the size of the article. Now the articles are rubbed or polished in the usual way and then placed in a solution of 10 per cent. oxalic acid and 90 per cent. water. After a few hours they are removed from this bath and dried and once more polished. By this process the plaster is changed into barium sulphate and lime oxalate, both of which are insoluble.

—1821—

Coloring Billiard Balls.

Billiard balls are usually genuine ivory, and in order to make them take the dye they must be immersed for a few minutes in dilute nitric acid, then rinsed off in clear water and wiped dry with a clean cloth before being placed in the following baths or solutions. In using the nitric acid be careful to protect your hands with rubber gloves.

For Red:—Soak the balls in a strong decoction of cochineal in ammonia water until clear water will not disturb the color given to the ball.

For Black:—Make a decoction by boiling two pounds logwood and one pound nutgalls in one gallon water and steep the balls therein for two or three days, then for a few hours in iron liquor (acetate of iron). Or you can use a weak solution of silver nitrate, soaking the balls therein for a few hours, then expose them to strong sunlight. The first formula is best, however.

For Green:—Dissolve distilled verdigris in vinegar (ordinary commercial will do) and soak the balls in this until colored. Or steep them in a mixture of two parts verdigris and one part sal ammoniac dissolved in water sufficient to take up all the salts.

For Purple:—Boil the balls for six hours in a decoction of one pound logwood in one-half gallon of water, adding more water, as it wastes in boiling, so as to keep the balls covered, then add two ounces of alum and boil one hour longer.

For Yellow:—Make a sugar of lead solution in water, soak the balls in this for twenty-four hours, take them out and let them dry of their own accord, then steep them in a solution of bichromate of potash. When color is deep enough remove and rinse in clear water.

For Blue:—Dye the balls green first, as above, then steep them in a hot and strong solution of pearl ash. Or boil them in a strong decoction of logwood for five or six hours, then steep them in a solution of blue vitriol.

Remember that tinware or other metallic vessels must not be used for any of the solutions here recommended; earthen or porcelain ware only being permissible.

Another method of coloring ivory is to boil the objects for a long time in aniline dyes; that is, in solutions of such dyes in water. Eosine may be used for red, picric acid for light yellow, potassium bichromate for strong or dark yellow, iodine green for green, nigrosene black for black, and so on, but the ivory must be first bleached by immersion for several hours in a solution of permanganate of potash and then in dilute sulphuric acid.

—1822—

Mending a Broken Alabaster Statue.

To one-half pint of vinegar add one-half pint of skimmed milk, beat it up into a curd. Beat up the whites of five fresh eggs and mix the curd with the egg

white. Then sift into the mixture powdered quick lime enough to form a paste, stirring it well, apply to the fracture, press firmly together, until the cement has set. The excess exuding, when pressing the parts together, can be removed while soft, and when hardened it can be leveled down with glass paper.

Another cement can be made by melting equal parts by weight of N rosin and beeswax, stirring in enough plaster of paris to make a paste, using this cement while still fairly warm in the same manner as above.

Perhaps the simplest way to fasten the pieces together would be to place a can of LePage's liquid glue in hot water to liquefy it, and stir into it some sifted quick lime, enough to form a soft paste. Apply quickly and press parts together before it has a chance to cool.

—1823—

Non-Waterproof Drawing Ink and Show Card Ink.

Mix thoroughly calcined lampblack of the highest grade with a solution of shellac and borax in water. To make the solution take an enameled metal pot, in which place one pint of water and one-quarter ounce borax, set in another larger pot, partly filled with water to keep contents of inner pot from scorching; heat until borax is dissolved, then add to the solution one ounce of seed lac or V. S. O. shellac and boil until the gum is fully dissolved. Much of the water having evaporated, add enough hot water until you have three-quarters of a pint (three gills). Make sure that the lampblack is free from unburnt oil by testing it with ether. As the liquid spreads out on the paper it will make a ring about the hillock of black and when the ether has evaporated the ring must not show a yellow or black discoloration, otherwise the black will not suit the purpose. The lampblack must be well mixed with the solution, which may be done in a mortar in a small way or by running through a hand mill in a larger way. It is best kept in thick paste and thinned with water for use. To make it flow well in drawing add a few drops of glycerine, but do not overdo it.

—1824—

Solvents for Mineral and Vegetable Waxes.

Paraffine, ozokerite and Montana wax also ceresine wax, are soluble in benzol, while paraffine wax is also soluble in benzine or gasoline. Beeswax and carnauba wax are best dissolved in turpentine, but heat must be used for these. The average melting point of beeswax is 140 degrees F., while that of carnauba wax is 180 to 185 degrees F. Paraffine wax has variable melting points, ranging from 95 to 145 degrees F. Oxokerite and Montana wax are similar in melting point, which is in the neighborhood of 135 degrees F. Of the mineral waxes, paraffine, ozokerite and Montana wax, as well as ceresine, about ten parts by weight may be dissolved in twenty parts by weight of benzol. Ninety per cent. benzol is best for the purpose, but the solution may be further reduced with more benzol or benzine. None of these waxes will render a good solution without the aid of heat. Beeswax requires at least one-half gallon of turpentine to one pound of wax for a limpid solution.

—1825—

Modeling Wax.

Melt fifteen parts by weight of white beeswax or japan wax with three parts by weight of spirits of turpentine in a water bath, and add one part by weight of oil of sesame (oil of benne), that you can obtain in any good drug store. Or you can melt fifteen parts yellow beeswax, four parts turpentine and one and one-half parts oil of sesame. When it is to be colored you must use only the finest non-poisonous colors; stir them into the mass while hot and liquid, and after cooling thoroughly knead the mass. When manufactured in a large way the cooled mass is placed in a power mixer and kneaded, which does the work more thoroughly than can be accomplished by hand.

—1826—

The Properties and Uses of Magnesite.

Magnesite is a variety of soapstone, and consists essentially of carbonate of magnesia in combination with silica, and occurs in amorphous as well as in crystalline form. It is found in many parts of the world—in California, Australia, Africa, India and many parts of Austria—but notably in Macedonia and Greece. Magnesite has a specific gravity of 2.8 and is found in almost pure white, but varies from white to grayish yellow. It is used largely for making cements, firebricks, mosaic tiles and in ceramic work generally. The magnesite linings for smelting furnaces and converters are made from magnesite that has been calcined at a temperature of 2,700 to 2,800 degrees, and are formed after mixing with water and dextrine under high pressure. For some purposes burnt magnesite is mixed with hot coal tar for insulating damp walls. Magnesite is also used to some extent in the manufacture of paint, especially as a filling material for low-priced greens.

—1827—

Fixative for Drawings.

The formula follows:—One pound of bleached gum shellac in granulated form is dissolved in one-half of a gallon of alcohol (the denatured kind, 188 degrees, will do) by shaking occasionally in a well-stoppered bottle with some powdered glass or fine white, perfectly dry sand. When solution is complete it is strained through cheese cloth so as to get rid of the glass or sand and other impurities, and then filtered through asbestos fiber, when a nearly colorless liquid will be the result that will be entirely matt and protect the drawing. It must be applied quickly with a wide camel's hair brush. One ounce of Canada balsam or Venice turpentine added before filtering will make it flow more freely.

A more simple method to fix water color drawings is to boil parchment in clear water until the size is clear, then strain, while still warm, and apply as many coats as are required, but let each coat dry hard before applying the next. Or make a thin size of isinglass or gelatine by boiling same in clear water. One ounce of either is sufficient for one gallon of water. In either case, after the drawing is so fixed it may be further protected by Venice turpentine or Canada balsam, dissolved in twice its weight of spirits of turpentine by gentle heat.

Still another good fixative that will not disturb the drawings is perfectly colorless prepared oxgall.

—1828—

Sulphuretted Hydrogen and Its Action on Metals.

Sulphuretted hydrogen is a colorless gas with the chemical formula H_2S emitting an odor similar to that of rotten eggs, and is the product of the decay of organic substances that contain sulphur, such as albumen, glue, casein, etc., but is also found in the atmosphere in certain localities where much bituminous coal is burned. It acts on metals, such as silver, lead, copper, quicksilver, as well as on their salts or compounds, by giving off its sulphur to them, causing them to blacken. So, for instance, when white lead is attacked by this gas, the black sulphide of lead is formed thus: $Pb \text{ (lead)} + H_2S = PbS \text{ (lead sulphide)} + H_2$. Sulphuretted hydrogen gas is made use of by analytical chemists in determining the presence of lead carbonate in paint without the necessity of a full chemical analysis.

—1829—

Testing the Purity of Gum Arabic.

The best gum arabic is that known as Cordofan, but even here it is possible that in sorting some inferior grades or even dextrine may be mixed in. It is an easy matter to determine the presence of dextrine by adding to the suspected

solution of gum a trace of potassium iodide (iodine dissolved in potash solution). When pure, there will be no change in color of the gum solution, while the presence of dextrine colors the solution red, and if starch be present the color will be bluish red. A watery solution of pure gum arabic, when mixed with potash lye and a few drops of solution of blue vitriol (copper sulphate) in solution, will give a blue precipitate that will not dissolve even if heated, while dextrine when treated in the same manner will also give a blue precipitate, but this will dissolve on a slight warming of the solution.

—1830—

Difference Between Liquid Asphaltum and Asphalt Oils.

Natural asphaltums are the residual products of petroleum, when the light hydrocarbon elements have been evaporated by natural causes. As they contain certain portions of vegetable and mineral matter, also some sulphuric and other acids, they must be refined by boiling or distilling to make them suitable for the use of the varnish or paint maker. According to the location where they are found, they are more or less intermixed with earthy substances, as, for instance, California asphaltum contains large portions of silica or flint, while Texas asphaltum contains carbonate of lime. The best known locations where crude or natural asphaltum are found are Egypt, Bermuda, Trinidad, Mexico, Cuba, California and Utah, although there are many others. The purest natural asphaltum comes from Egypt, and the best grades from all sources are also known as bitumen or mineral pitch. These must not be confounded with coal-tar asphalt or coke pitch, the latter having a lower melting point and being less resistant. M. O. Wood, in his work on "Rustless Coatings," quotes Boussingault in "Amer. Chem. Phys." as describing asphalt or bitumen to consist of two definite substances, viz., asphaltene, which is fixed and soluble in alcohol, and petroleum, which is oily and volatile.

—1831—

Saponification of Carnauba Wax.

Carnauba wax cannot be saponified with borax so that the product will remain uniform and that no separation of unsaponified wax will drop out. Calcined soda is a better means to effect saponification of this hard wax. But it is best to use a certain portion of a softer wax, such as Japan wax. A desirable wax soap may be had when ten parts by weight of Carnauba wax and five parts by weight of Japan wax are boiled with a solution of four parts by weight of calcined soda in one hundred parts of water, until every particle of wax is dissolved. To reduce the consistency of the mass, when desired, use boiling hot water only.

To saponify Carnauba wax without the addition of a softer wax, use for every ten pounds of the wax a solution of potash 40 degrees Be., of which, if the wax is pure, about seven pounds will be found necessary. The saponification is effected by first melting the wax in water and then carefully stirring in the potash solution.

—1832—

What Is the Wood Preservative Carbolineum.

Carbolineum was first used to prevent dry rot in the stakes used in the vineyards along the Rhine and for impregnating the ties on the railroads in Germany. Its inventor was an officer of artillery, named Avenarius, and, if we are rightly informed, his invention was patented in Germany in 1871 and later on in this country also. The process of preparing Carbolineum Avenarius, as the prepared article is known in distinction from raw carbolineum, consists in treating the latter, which is really liquid oil of anthracene, while partly heated

with a current of chlorine gas or by the addition of resin, boiled linseed oil or mineral salts, such as zinc chloride and sulphate of copper.

The treatment with chlorine gas or mineral salts effects a bleaching action and greater conserving power, while the addition of rosin or linseed oil is to make it work more freely and dry more rapidly.

—1833—

Bleaching Yellow Pine.

This is a very difficult proposition, because of the very sappy or resinous nature of the wood. Oxalic acid, of course, is too weak. Acetic acid of good strength would be next best, but is apt to cause discoloration. The very best bleaching agent would be muriate of tin; that is, tin dissolved in muriatic acid (hydrochloric acid) and diluted with water. This must, however, be washed off thoroughly after it has taken effect and dried. Vinegar will counteract the effect of the acid treatment. Another treatment is to mix seventeen and a half parts, by weight, of chloride of lime and two parts of soda crystals with enough water to make a sort of semi-paste that is applied to the wood with a fiber brush in a thick layer and allowed to stay for one hour, then removed and the wood washed with a solution of sulphurous (not sulphuric) acid to remove all traces of chlorine, then washed again with clear water.

—1834—

What Is Dead Burnt Sulphate of Lime?

Dead burnt sulphate of lime (calcium sulphate) or gypsum, as it is more familiarly known to paint makers, while an article of commerce, sold under the trade name "Annaline" in continental Europe, has been very little thought of in this country until within the last decade, when the specifications for Venetian red referred to were issued. Sulphate of lime, or gypsum, as found in nature, contains close to 21 per cent. of its total weight of water of combination, and in that state it is almost transparent. When the combined water is removed from gypsum by calcination, so that only 5 per cent. by weight of the water of combination remains, which is usually effected by heating to 300 degrees F. for a certain length of time, then it is known as calcined plaster or plaster of paris, which has the faculty of absorbing water and to set and become hard, a fact so well known that it would be idle to dwell upon it at length. When, however, the process of calcination is carried further until the mineral contains less than 3 per cent. of its water of crystallization, then it is considered dead burned, because it will not bind again when mixed with water. In this state it is more opaque when ground in oil than the natural gypsum, and when ferris sulphate (copperas) and gypsum rock are roasted together in a furnace at high temperature the gypsum is naturally dead burned, and material made by such process is referred to in the specifications you allude to. If it is an established fact that natural gypsum is to a slight extent soluble in water, then it follows that the dead burnt article is not.

—1835—

Protection of Lead Pipe Against Vapors of Acetic Acid

This can be accomplished by giving the pipe several coatings of a solution of pure para rubber or gutta percha in 90 degree benzol. Before applying the solution a small portion of flour of pumice or magnesium silicate is added, and also for every quart of the solution one pound flour of sulphur. If possible the pipe, after coating, should be subjected to a temperature of 250 degrees to 300 degrees F. in order to harden the coatings.

—1836—

Impregnated Silk Threads on Fishing Poles.

Exterior of spar varnish will not serve the purpose, because continued contact with water will turn it white, and amber varnish is too dark and tends to discoloration of the silk thread. Celluloid lacquer made by dissolving guncotton in amylacetate is the best means to prevent discoloration, but does not stand continued contact with water. Very pale kauri or Zanzibar gum, preferably the former, known as XXXXX, finely pulverized, dissolved in amylacetate, settled and filtered after solution, is the very best means to accomplish the object.

—1837—

Tailor's Chalk for Marking Cloth.

This chalk is steatite, or soapstone, of a very fine grade furnished chiefly by the Societe Anonyme des Talcs de Luzenac, in France, and also by the Societa Talco e Grafite Val Chisone, Pinerolo, Italy, while it can be produced from chalk, kaolin, talcum, white bole, etc., which are powdered very fine and mixed with such binders as solutions of glue, dextrin, gum arabic, gelatine, etc., in water, then formed into square or round tablets that are dried with moderate heat to prevent cracking of the tablets. To make it extra unctuous a small portion of an emulsion of wax and soap is added.

—1838—

Carriage Top and Leather Dressing.

For dressing any kind of leather, such as carriage tops, curtains, etc., heat one quart genuine neatsfoot oil and melt therein four ounces beef suet. Then add one tablespoonful of melted beeswax, mix all thoroughly and strain while warm. Put in tin and cork well until you wish to use it. Apply with a soft sponge. It will serve for rubber as well as for leather. For hiding worn places, add a little drop black ground in oil. For a glossy dressing, melt one ounce beeswax in enough turpentine to make it the consistency of varnish and add it to one quart of good finishing varnish. Finally add enough drop black, ground in japan—say about a quarter pound—to give a good black luster.

—1839—

Treating the Head of a Bass Drum.

If the drumhead is new go over it with a cloth moistened with alcohol and let it dry well. Do not attempt to use oil color for lettering, as it would peel in a short time, but use colors ground in japan, thinned with turpentine, as you would for striping a vehicle. Two coats will be required and the first coat should have some varnish added for extra binder, while for the second, or finishing coat, only a trifle of varnish is required, just enough to make the colors dry with a faint eggshell finish. For black use good drop black; for blue either ultramarine or a mixture of flake white and Chinese blue, and for red use English vermilion, dark shade. Shade the letters with appropriate colors same as you would on a sign.

—1840—

Restoring Finish on Oil Cloth.

To be successful will depend very largely on the condition of the old oilcloth, whether the original paint is brittle and cracked. If it is table oilcloth it will not pay to try to do it over and it is doubtful whether it will pay on floor cloth. You will have to use a graining ground and this, in order to be elastic enough

to permit of rolling up without cracking, should be made of pure white lead in oil tinted with oil color and thinned with turps so as to dry with no higher than eggshell gloss. The graining is best done with oil color and done in such a way that it can be varnished over to give the proper gloss finish. It depends on the cost, whether you can afford to give one or two coats of varnish, but whatever varnish you use should be a hard drying, yet elastic floor varnish.

—1841—

Lettering or Ornamenting on Velvet.

The best method for painting or lettering on velvet is to use oil colors, such as come in tubes. Place the color on a piece of blotting paper, so that some of the oil is absorbed by it. Make your design on the velvet by stamping or pouncing and trim your brush with a pair of scissors so that the hair is not over one-eighth of an inch in length and round at the point. Dip your brush into the color on the blotter and proceed to comb the nap of the velvet with the stiff brush that you have trimmed for the purpose. The depth of the finished letter or design will be proportionate to the number of times you have applied the brush in the manner described, as the combing of the nap simply stains it and leaves it flexible and, therefore, more durable.

—1842—

Adhesive for Securing Paraffined Paper.

This is a problem we have never tested out, as paraffin coated paper is principally used to prevent objects from sticking to one another. We should think, however, that if you add to good flour paste, such as used by paper-hangers, some Venice turpentine, say, one gill of this to one-half gallon of the paste, the paper will most likely adhere, if not too heavily coated with wax. The Venice turpentine must be stirred into the warmed paste. Probably the addition of two ounces of powdered alum to one quart of paste will serve the purpose, the chief requisite being to give the paste an opportunity to obtain a hold on the paraffined paper. You might also try Le Page's liquid glue, which you can obtain, ready for use, from any good paint supply house.

—1843—

Sherardizing or Vapor Galvanizing Method for Metal.

The method of sherardizing metal was asked for.

We quote from Cushman & Gardner's work, "Corrosion and Preservation of Iron and Steel," the following:—The Vapor Deposition Process. The Cowper-Coles method of vapor galvanizing, which is known as sherardizing, is a development of recent years. Vapor galvanizing is distinctive from all other forms of galvanizing, inasmuch as the vapor of zinc is employed for coating metal articles instead of dipping them into molten zinc or into an aqueous solution through which a current of electricity is passed. Two forms of vapor galvanizing are practiced, namely, the "zinc dust process" and the "molten zinc vapor process." In the first process the zinc dust and the iron articles to be coated are placed in an airtight iron drum, which is heated in a gas-fired furnace to obtain a temperature within the drum of about 600 degrees F. The length of time at which the drum is kept at that temperature depends upon the thickness of the coat required. The drums are emptied over an iron grid, which retains the zinc coated article and allows the zinc dust to collect in a receptacle in order to use it over again for charging the drums. The coating is distributed evenly and is alloyed with the iron surface. According to claims made, the alloy is non-corrosive and does not rust even when the zinc surface is removed by abrasion. The advantages of vapor galvanizing are said to be that it is cheaper than the

ordinary hot galvanizing, forms a better protection, and at the same time enables screw threads and machine work to be coated with an even distribution of zinc, so that the parts fit together properly. In the "molten zinc process" the materials to be coated are placed in a cage or hollow drum, which is slowly rotated inside an outer cylinder composed of wrought iron to insure an even coating. The metallic zinc is heated by means of gas, or any other suitable means, to a temperature sufficiently high to volatilize the zinc at the same time that hydrogen or any other gaseous reducing agent is forced into the apparatus. A modification of the vapor process is applied to the inlaying and decorating of metallic surfaces, which surpasses all other methods in artistic effects. Furthermore, it has the advantage that a number of metals may be blended together which hitherto has been impossible, and alloys of many tints and colors can be obtained in one operation.

—1844—

Muriatic Acid Disfiguring Cement Floor.

Muriatic acid will disintegrate cement to a certain extent by dissolving its lime contents and wherever the acid has been dropped the surface will be very rough and the coloring matter discolored. There are several ways to correct the trouble. One of these is to mix some Portland cement with water, adding some silicate of soda and coloring it to match the floor, giving a skim coat of this to the patch affected by the acid. This would have to be applied to a piece of board to ascertain that the right color effect is obtained before applying it to the floor. Another and perhaps simpler way would be to take some glazing or knifing-in lead, coloring it to match the floor as nearly as possible and apply it over the defective space with a wide spatula, in the same manner as is done in filling a coach panel or troweling plastered walls.

—1845—

How Backgrounds for Photography Are Prepared.

Use close grain packing canvas cloth and tack onto a frame, pulling out projecting fibres. Do not stretch the cloth very tight, as it shrinks on painting. Coat it two or three times with the following mixture:—Dissolve one-half pound ordinary gelatine in one gallon of water, add two ounces of sugarhouse molasses. Beat up one-quarter pound of whiting with a portion of the mixture to a creamy paste, then add all of the mixtures to the whiting paste. When the sizing is dry after filling the cloth, sandpaper the surface, then paint it over with white lead in oil that has been tinted with lampblack part in oil and part dry and thinned with turpentine only. When this coat has dried, give a finishing coat of flat paint, which stipple immediately with a soft brush. This finishing coat should be dark brown.

—1846—

Waterproofing Backs of Wood Finish in Concrete Buildings.

The very best and probably the only means to keep the wood from being affected by the moisture coming from the source mentioned is to dissolve one part by weight of paraffine wax in two parts by weight of heavy coal-tar oil, also known as heavy naphtha, which is readily obtainable in your State. As paraffine wax has a melting point between 118 and 130 deg. F., the solution can be made by steam heat without fire risk. It should be used fairly warm and several applications made. However, even by the use of this moisture shedding preparation, you cannot guarantee to keep the wood from warping, when the walls are not entirely dry or when moisture percolates through from the exterior of the walls. Even if the walls were waterproofed on the inside by painting, the moisture coming through from the outside is apt to throw off the paint back of your wood finish.

—1847—

Wood Alcohol, Methyl Alcohol, Denatured Alcohol, Methylated Spirits.

Wood alcohol and methyl alcohol are different names for the same thing. The specific gravity is .8021. Ordinary denatured alcohol, according to the United States law, is grain or ethyl alcohol, rendered unfit for drinking or mechanical use by the addition of 5 per cent. wood alcohol and 5 per cent. benzine or similar petroleum distillate, to 90 per cent. of grain alcohol. Depending on what is used for denaturing, the specific gravity is about .8200. Methylated spirits is grain alcohol denatured with 10 per cent. of wood alcohol, or methyl alcohol, and has about the same specific gravity. In the United States "special denatured alcohol," which is identical with methylated spirits, can be used only by manufacturers under bond, that it will be used for manufacturing purposes only and will be sold as part of a finished product, such as shellac varnish. Next to the pure grain alcohol, the special denatured or methylated spirits is generally considered best for cutting gum shellac.

—1848—

Stearine Pitch.

Stearine pitch and candle tar pitch are obtained by the distillation of animal fats or refuse. Both are used instead of linseed oil in the manufacture of asphaltum varnish, imparting elasticity but not as high a gloss as boiled linseed oil.

—1849—

Fireproofing Cheese Cloth or Light Muslin.

Eight parts by weight of pure ammonium sulphate, two and one-half parts by weight of pure ammonium carbonate, two parts pure borax, three parts boric acid and two parts best starch are dissolved in one hundred parts of soft water, and the resulting solution is heated to and kept as closely as possible at 90 degrees Fahrenheit, when the material is impregnated with it by immersion. The tissue, after immersion, is wrung out and dried, when it may be ironed, if necessary. This formula will produce about twelve gallons of liquid and each gallon should impregnate fifty to sixty yards of material. All parts given above are by weight.

—1850—

Japanning Tinware on a Small Scale.

Japanning is an art and the process employed varies to a great extent and cannot be done successfully without the proper stoving apparatus and a thorough knowledge of the materials required for the different effects. Much skill is necessary to meet with success.

You can imitate japanned tinware by first cleaning the new tin of its coating of palm oil by immersing it in strong sal soda solution, then wiping with a dry cloth and rubbing it over with fine whiting. Apply the very best turpentine asphaltum varnish with a fine varnish brush and bake each coat in the oven of a gas stove at a heat of 212 deg. F., giving as many coats as are required to produce a high gloss and uniform covering.

—1851—

Greening Brass Metal Sign Plates.

Information wanted to produce the pale green used by the makers for a background on brass metal signs.

The greening of brass which will stand exposure, cleaning and polishing from time to time is done by a chemical process, the method of operation being as follows:—Place the polished brass plate in a bath of 120 grains of copper sulphate and 30 grains of hydrochlorate of ammonia in one pint of water, polished side down. The depth of the green depends upon the time of immersion. Another method is to immerse the plate in a solution of one-half pound perchloride of iron in one pint of water, but this will not produce a pale green tinge, such as you desire, but rather an antique green effect.

When you have the right color, the plate should be washed, dried and repolished with sweet oil and rotten stone.

—1852—

Substances for Fly Paper—How Prepared.

Powdered black pepper is mixed with syrup to a thick paste, which is spread with a wide brush upon coarse blotting paper. Common brown syrup will answer, but syrup made from sugar is preferable, as it dries more quickly. For use a piece of paper is laid on a shallow plate and dampened with water. This is safest to use where children are about, it being non-poisonous.

Another recipe is to melt rosin and adding boiled linseed oil, then add honey to make it the consistency of syrup. Soak manila paper in a strong solution of alum and let it dry, then apply the substance with a brush.

—1853—

White Ammonia, or Household Ammonia.

Shred or shave four ounces of laundry soap, or white ivory soap, fairly fine, and dissolve by the aid of heat in four pints of rain water; then cool and add four pints of 16 per cent. aqua ammonia. When higher strength of ammonia is used use five pints of rain water and only three pints of aqua ammonia. This is also sold as "household ammonia."

—1854—

Non-Oxidation of Iron in Reinforced Concrete.

A writer having noticed some articles recently on the construction of ships with reinforced concrete or cement would like to have us publish whatever information we have on the subject, as he has some doubts as to whether the metal used for reinforcing the material will not corrode sooner or later and thereby weaken the structure, especially in contact with salt water.

This is a somewhat new subject, so far as ship construction is concerned, but enough is known, through an experience of fifty years or more, and ample evidence is available from the construction of piers at seashore resorts, that when iron or steel is imbedded in properly mixed or prepared concrete of the right tensile strength, no corrosion of the metal takes place, even when the metal has been allowed to rust before being imbedded. Research in Europe, as well as in this country, has proved that metal (iron or steel) without rust will not take on a particle of rust so long as it is protected from infiltration of moisture and air by the cement, and a recent writer states that in several instances it was discovered that where partly rusted iron was used to reinforce cement structures and the iron was laid bare for inspection after a number of years, the cement covering had acted as a rust remover, showing the iron to be bright and without any signs of actual corrosion below the mill scale, which formed the rust originally. This author cited cases of various periods, from 14 to 37, and even 54 years. Still, his article did not mention exposure to or immersion in salt water, but, no doubt, our constructors here have had ample experience or they would not hazard constructing ships of concrete. The question of indestructibility by modern projectiles is one that must be left to be solved by naval constructors, and we have nothing to base any information on this point.

—1855—

Best Grade of Naphtha for Cutting Asphaltum.

Coal-tar naphtha or benzol makes an excellent solvent for asphaltum, but the best grade, the decolorized article, is too high in price to use, while the so-called light oil or solvent naphtha cannot be depended upon for permitting the resultant varnish to dry within the required time. When a high flash point is desired, similar to that given with the use of turpentine as thinner or solvent, it is best to use petroleum naphtha or spirit of 49 deg. or 50 deg., such as is sold for so-called turpentine substitute; but paints or varnishes so produced are rather uncertain in drying, unless drying mediums, such as manganese or litharge, are added while melting the gum. For a fairly quick drying product the use of deodorized 59 deg. or 62 deg. benzine, known to the trade as V. M. (varnish makers) or P. N. (painter's naphtha), is recommended. In shipping the latter sort of goods, however, the containers must bear the red label required by the Interstate Commerce Commission, while such label is not necessary on goods where the flash point is not lower than that given by the goods thinned with pure spirits of turpentine.

—1856—

Waterproofing Light Weight Cotton Ducking.

The best coating, that will shed the water, leave the canvas pliable and will not require more than one application.

As you wish to get along with one coat only, the following method is the simplest we know of:—Soak one pound of good animal glue in one quart of water for at least five hours, then dissolve it by heat and mix this with a solution of one pound of chrome alum in one quart of water. Apply this, before it has time to set, to both sides of the canvas or ducking. Do not make any more than you expect to require, as when the mixture once sets it cannot be liquefied again. To apply the coating it is best to have the canvas in a stretching frame.

—1857—

How Common Sealing Wax May Be Prepared.

Shellac and Venetian turpentine, which are the principal ingredients in the medium and best grades of sealing wax, are extremely high in price at this time, so we shall not attempt to describe any of those, but confine ourselves to material that we believe will serve your purpose. Nor do we think that you would care to install an apparatus for making the wax, as you would require in making it for commercial purposes, that is, to sell it. For your own use you will simply need two earthen or stoneware melting pots, but it is safer by far to use enameled cast iron in place of the former, thus insuring greater uniformity of heat and less risk by fire. Instead of a furnace an old fashioned cooking stove will serve the purpose, or a suitable gas stove or gas range will suit the purpose.

Place in the large pot 6 ounces of orange shellac and 24 ounces of N rosin and melt these at low heat. When liquid, introduce 15 ounces of crude turpentine (gum thus or gallipot), and let this dissolve in the melt. This mixture must be kept stirred with a hardwood paddle. When well united, take from fire and add 2 ounces spirits of turpentine and stir in little by little 10 ounces pulverized chalk, which must be bone dry, and 16 ounces of dry red lead. Stir until perfectly uniform and free of all lumps. Then place kettle back on a very slow fire, so as to keep it liquid enough to pour into the molds. These can be made of hardwood in two pieces, which are held together by clamps, while the warm wax is poured in from one end, and the simplest way is to make the sticks square by having the molds hollowed out, but they can also be round by having the molds bored to the desired size before splitting them. This wax is of a good red color, not so brownish as it would be if oxide of iron red were used as the

coloring matter. For the green wax add to the liquid mixture, while warm, enough ultramarine blue and lemon shade chrome yellow to produce the desired shade of green, but it is best to rub these colors down to a fine paste with the mixture and warmed before stirring into the mass.

By increasing the quantity of shellac and decreasing quantity of rosin correspondingly, a less brittle and tougher sealing wax will be the result, but, of course, the cost will be considerably higher.

—1858—

Dissolving Old Rubber Hose or Footwear.

How can liquid rubber be made by dissolving old rubber articles, such as hose or rubber shoes and boots, etc., so that it could be applied with a brush, like paint?

We cannot recommend to you the experiment of trying to make liquid rubber from old wash material for the reason that it would be too costly, at the present time, besides being dangerous and the game would not be worth the candle. The rubber you expect to use is not pure, because other materials enter into the manufacture of the articles in question, which would drop out on dissolving and be of no value to you whatever, besides the rubber itself has lost its original property to a great extent. The most powerful solvent for old rubber is carbon bisulphide, whose vapor is not only poisonous, but is very inflammable and when mixed with air very apt to explode. Five parts of the solvent are required to one part of the old rubber, both by weight. In order to avoid any risk, the rubber solvent should be placed in a strong kettle of heavy boiler iron, provided with a safety valve, which is placed in a hot water bath to hasten solution. There are other solvents for pure rubber, which, however, would not answer here. If you wish liquid rubber to add to paint for a purpose, we would strongly advise you to purchase a small quantity of pure Para rubber, cut it in very small shreds with a pair of shears or a thin sharp knife, which dip into water to make it cut freely, and place in a glass jar or in tin cans. Cover the shredded rubber with coal-tar benzol or spirits of turpentine or petroleum spirit, cover the container to stop evaporation, keep in a warm place where no flame will come in contact with any vapor that may escape and shake up or stir occasionally. The solution will take quite some time, depending on the temperature, but in no case must the temperature be higher than 90 deg. F. When the solution becomes too thick, add more solvent.

—1859—

Linseed Oil Soap in Cake Form with Pumice.

By following the directions given below you can make a good linseed oil soap with or without pumice, but in introducing the latter you must use the finest powdered article, known as flour of pumice. The manipulation appears to be simple enough, but, as in cooking meals, there is a certain knack about it, which is acquired by practice and watchfulness. Dissolve by moderate heat in a clean vessel 5 pounds caustic soda, full strength, 9 quarts of rainwater, or other soft water, and let the lye so produced become cold. In a suitable kettle, of about 12 to 15 gallons capacity, place 5 gallons of pure, raw linseed oil and set the kettle on a slow fire, but do not heat the oil to over 100 degrees F. Have ready a clean wooden paddle and add slowly in a thin stream the soda solution, while continuously stirring the oil and lye together, until there is no more separation of oil and water and the mixture is of the consistency of honey. Not over 20 minutes should be required, except in very cold weather. Should the mixture separate again, keep on stirring until separation ceases. Have one or more suitable wooden boxes ready, the inside of each of which is well moistened with water and pour the liquid into these. Set them in a warm place until next day, when you will have a block of soap that can be cut up into cakes with a fine wire. By exposing the cakes to dry air they will

become hard in a few days, and by adding to the mixture, while still liquid, say, 10 or 15 drops of oil of myrrbane, you will have an imitation of almond soap. By adding to the mixture, while still liquid, one pound of pumice flour or more, if you think necessary, mixing all very thoroughly, free of lumps, you will have linseed oil and pumice soap.

—1860—

Automobile Top and Leather Dressing with Alcohol Solvent.

Practical formula for automobile top and leather dressing that can be made with alcohol as a solvent. Also what may be added to shellac varnish to keep it flexible and not injure the dye used to color the dressing.

We take it for granted that you have in view a black dressing for leather tops, and this being the object, we suggest the following preparation:—Dissolve 30 parts by weight of ruby shellac in 130 parts by weight of alcohol, then dissolve 5 parts of nigrosene black in 15 parts by weight of alcohol, and one part gum sandarac in 5 parts of alcohol, and when the shellac and sandarac are dissolved, add of Venice turpentine and castor oil 2 parts by weight each, and finally the solution of aniline black. Strain through cheese cloth or fine sieve and see that the mixture is free of lumps. Apply with a good varnish brush. This will dry fairly quick, and is not only flexible, but tough and durable. When castor oil is added to shellac dissolved in alcohol, it will make the solution flexible, and its more or less quick drying depends on the proportion of oil used.

A non-cracking black top dressing for leather may be prepared by melting together 3 parts by weight of rosin, 3 parts genuine Venice turpentine, and 6 parts gum sandarac. When uniformly melted, add little by little 3 parts spirits of turpentine and allow the mass to cool. Then dissolve the cold mass and 12 parts of 95 per cent. alcohol. Filter the solution and add 2 parts dry lampblack triturated with alcohol. Apply with brush and if drying too rapidly, add a very small portion of castor oil or refined glycerin, preferably the former. Spirit soluble nigrosene black may be used in place of lampblack, if intense black is desired.

—1861—

Painting Caned Chairs or Wicker Work.

One of the difficulties is that people wait to have work of this sort done until they are actually in need of the goods. Then the surface is not cleaned properly; the paint is applied over grease and every other matter disastrous to the adhesion or drying of paint.

All work of that sort should be treated to a thorough washing and scrubbing with soap suds and water or water and ammonia, and well rinsed afterwards. Then drying must be permitted before applying paint of any kind, which must be quite thin.

The principal thing in this kind of painting, whether a pigment paint is being used or a stain, is to have the paint or stain of the greatest hiding power with as thin a medium as possible, whether it be composed of oil, turpentine, hard drying varnish or spirit varnishes or enamel paint of one sort or another. Next important is the application of the material in a way that will not clog meshes or make it run down and make a mess, which will adhere to the hands in moving the goods from place to place.

In making up chair enamels or paint for caned seats and wicker work, unless very hard gum varnishes are employed as thinners, a first class coach japan should be introduced in addition to the varnish and petroleum spirits of any kind omitted. Inferior varnishes and liberal use of oil products have no place in this class of goods.

—1862—

Liquid for Transferring Engravings to Paper.

Dissolve one-half ounce common yellow soap in two quarts boiling hot water and add to this one-half pint spirits of turpentine. Spread this liberally on the printed surface with a soft brush, then dampen the plain white paper with clear water, let it stand a few minutes and place the two papers together for one minute, pressing lightly, and when they are pulled apart you will find the transfer made.

—1863—

Mending a Torn Automobile Seat Cushion.

I am running a repair shop and recently had an auto in the shop to be touched up. On the arm of one of the two front seats I found a triangular hole, which I was puzzled how to cover up. Calling in a friend he told me to go to the drug store and get some black adhesive plaster, then lift up the torn edges, being careful not to wrinkle the flaps, then work the adhesive plaster, sticky side up and press down the flaps, so as to make the edges come well together and press lightly with a warm flat iron. When dry, brush the cloth the way the nap runs. I followed his advice and made such a success of the job that the patching could not be noticed. This may be of interest to some of your readers, for which reason I send it to you.—*E. B., Rhode Island.*

—1864—

Best Material for Free Hand Relief.

The following has been found very useful and to work very nicely:—One pound fresh calcined plaster (plaster Paris), one quarter pound dry white lead powdered and two teaspoonfuls bicarbonate of soda (baking soda) are intimately mixed with water to form a thick paste, and immediately filled into the rubber bulb, when it is used to work out the design, which has been previously marked off. The material can be tinted or colored as desired by mixing the required color in the right quantity with the plaster paris. The bicarbonate of soda is added to keep the material from setting too quickly, and while the relief is still wet, brocade or bronze powder may be sprinkled over it. If you wish to use color that will not stand soda, you can add pulverized marshmallow root in place of the baking soda, say, one-half ounce to each pound of plaster.

—1865—

Deodorizing Mineral Spirits or Petroleum.

For a barrel of the spirit mix 2 ounces of fresh, dry chloride of lime with the same quantity of acetic acid. Stir these well together and put into the barrel, bung it up, and then roll the barrel over the floor for about five minutes. Take out the bung and let the barrel rest for 24 hours, then draw off the contents into another container and the spirit will be clear, the lime and acid being at the bottom of the original barrel. Add 4 ounces of fusel oil to the clear spirit, shake well, allow to settle and the spirit will be found to be well developed. When time is an object, the lime and acid treatment may be dispensed with and the fusel oil added at once, but the former way produces best results.

Another method is to mix 7 pints of benzine and 3 pints of fusel oil, shaking well and setting aside for future use. This mixture is milky, but becomes clear in a day or so. Knock the bung out of a barrel of benzine and put in a heaping tablespoonful of fresh powdered chloride of lime, put back the bung and shake the barrel gently. Then mix 1 ounce each of strong acetic acid and water and add to contents of barrel, which roll for a while and let it rest for a day; then

add two quarts of the benzine and fusel oil mixture. For simply masking the odor of benzine or mineral spirits, put in a barrel of 50 gallons 4 ounces oil of birch and agitate well. The odor generated by this method is not readily recognized.

—1866—

To Test Water for Impurities and Organic Matter Generally.

Wanted to know whether it is safe to use rain water in distemper colors, as some writers have claimed that rain water is water in its purest form, next to distilled soft water.

Rain water is generally considered to be pure, but in its passage through the atmosphere it carries with it some ammonia and more or less of the minute animal and vegetable organisms floating in the air, which are often present in such quantities that their decomposition renders rain water more or less putrid after it has stood about for some time. It may be clear, colorless and even sparkling, with no unpleasant taste or odor, and yet contain a large quantity of organic matter. There is a very simple test by which its presence may be determined. Pour into a clear, colorless bottle with a glass stopper about a pint of the suspected water with, say, 5 grains of white lump sugar, and expose the bottle to the daylight of the window in a warm room. If inside of a week or 10 days the water become turbid, there is organic pollution of some sort and the water is unfit for the use you speak of, as well as for drinking, and should be filtered or boiled in an enameled kettle and permitted to settle before use.

—1867—

Determination of the Presence of Moisture in Living Rooms.

A simple method to determine the quantity of moisture in rooms that are apparently dry and yet show mold on leather, as, for instance, on shoes, is to weigh out on a delicate scale certain portions of freshly burnt lime, noting the quantity and placing some on one or more dishes, which, in turn, are placed near the center of the room, which is tightly closed and so kept for about 24 hours, when the lime is reweighed and the gain in weight, if any, will give the percentage of moisture. Eminent medical authorities assert that one per cent. of moisture thus determined proves that the atmosphere of the room has a sufficiency of moisture, and that a trifle more makes the room unhealthful, especially to sleep in, while one-half of one per cent. will not be too dry.

CAR AND CARRIAGE AND AUTOMOBILE PAINTING.

—1868—

Painting the Equipment of a Small Railroad.

A painter located at a town in California in charge of the painting interests of a small railroad with an equipment consisting of about a dozen passenger cars and half that number of locomotives. A limited experience in car work prompts him to ask the following questions, to which replies subjoined:—

1. What is used to clean the outside of cars before varnishing?
2. What is used to clean canvas headlinings before varnishing?
3. How is the woodwork on the inside of coaches cleaned?
4. What is used to polish the interior of coaches?
5. State the best method of mixing gold bronze.
6. State method of cleaning and polishing lamps and brass fixtures of passenger car equipment.
7. Give formula for making a lacquer to use upon the brass to keep it from tarnishing.

Reply to query 1.—Car cleaning formulas are almost, if not quite, as numerous as car paint shops. Here is one, however, that has for many years been used by an important Eastern railroad. Soap formula for cleaning passenger car surfaces:—Soap stock, fifty pounds; sal soda, ten pounds. Boil the ingredients in water for from three-quarters to one hour. Then add enough water to make 110 gallons of soap ready for use. This used in conjunction with water, No. 1½ pulverized pumice stone, and a handful of upholsterer's moss, to scour the surface, after which it is rinsed off with clean water. This same soap is used to wash the headlining, and, in fact, the interior woodwork, as referred to in queries No. 2 and No. 3. If accumulations upon the canvas headlining fail to be removed with the soap and water, add a little sal soda to a small quantity of the soap, thus making it more powerful in its action, and go over a small space of the lining to test the eliminating properties of the compound. Of course, it goes without saying that care and close attention to the work is necessary to do this washing and not burn the wood. As soon as the dirt and surface accumulations are sufficiently loosened wash immediately with clean water.

Query No. 4.—To rub the gloss and bring the interior finish to a dull gloss use crude oil and No. 00 pumice stone. Panels to be polished should be first water rubbed, and then polished with some good varnish polish.

No. 5.—The best method of mixing gold bronze is a matter of individual opinion. A good formula consists of mixing the bronze in two-thirds pale drying japan and one-third railway finishing varnish.

No. 6.—For our friend's need the methods and equipment at the disposal of the big shops would be too expensive. In the absence of nitric and sulphuric acid dips, provide some receptacle large enough to hold a few pieces of the brass equipment. In this make a dip of water and caustic soda in the proportions of five pounds of caustic soda to twenty gallons of water. This will eat the old lacquer off, but it will not remove the tarnish. In a second receptacle use one-quarter pound of oxalic acid and twenty gallons of water. After first immersing the brass in the caustic soda solution, remove it to the oxalic acid bath, after which wipe off and polish with metal polish. Then wash and dry thoroughly, preparatory to lacquering. It is understood, of course, that this is the so-called primitive method used only in case the buffing wheel and other modern brass finishing apparatus is not at hand. When nitric and sulphuric acid are used the proportions should be two parts of sulphuric and one part of nitric acid.

No. 7.—It is cheaper to buy lacquer for brass than to shop-manufacture it, and finer and more durable results are to be obtained thereby. As a mere substitute for the fine lacquers now to be bought of almost any dealer in paint shop

supplies, thin pale railway body varnish with turpentine and apply very carefully. Do not undertake to handle the brass until the varnish is thoroughly dry. Another substitute is white shellac. A very decent sort of lacquer for brass may be made of one ounce each of shellac, dragon's blood, annatto, gamboge; one-quarter ounce saffron and one-quarter gallon of grain alcohol. Dissolve the coloring matters in a small quantity of the alcohol separately, then in the dissolved resin mix altogether until a thorough incorporation is established.

—1869—

The Painting of Steel Passenger Equipment. (a) How Should the Interior Be Treated? (b) How Should the Exterior Be Treated?

A composite paper written by J. D. Wright, Baltimore and Ohio R. R., Baltimore, Md.; R. J. Kelley, Long Island R. R., Brooklyn, N. Y., and H. M. Butts, N. Y. C. and H. R. R., Albany, N. Y., at the 1907 convention of the Master Car and Locomotive Painters' Association makes the following recommendation:—

1. That, before it is coated, all rust, scale, oil, grease and dirt be removed from the surface of the metal, by the use of a sand blast, or acid bath. A protective coating should then be applied before additional rust forms on the surface.

2. That, during the process of construction, all concealed parts receive at least two coats of a good metal preservative coating of a non-inflammable nature.

3. That metal used for parts that are to be coated with a view of improving their appearance, be level and smooth as possible, free from waves and roughness, and the construction such that it will not be necessary to fill joints with putty.

4. That the established methods of painting the exterior of wooden cars, with slight modifications, may be safely used for the steel equipment.

5. The production of a smoothly finished surface, both exterior and interior, because it facilitates terminal cleaning. And modification of exterior marking and striping to make it conform to the new conditions.

6. That efforts be made to produce a finishing enamel that will, in all respects, equal flat color protected with clear varnish.

7. That the exterior parts, painted mainly for their preservation, such as roof, underframing, trucks, etc., receive at least three coats of a good metal preservative.

12. That all interior parts which can be conveniently removed be treated with a baking enamel; all other interior parts to be rubbed to a smooth finish that can be easily cleansed.

13. That the steel be treated, so far as consistent, in such a manner that it will retain a metallic appearance, and not imitate inferior articles.

—1870—

Report of Committee on Steel Cars.

The following report was adopted by the 1904 convention of the Master Car and Locomotive Painters' Association:—

It is the sense of this association that, in the construction and painting of steel cars, the following points are of vital importance to their preservation:—

1. All flash or mill scale, rust, oil, grease and dirt should be entirely removed from all parts entering into the construction of cars before any paint is applied. We believe that this can be best accomplished by use of the sand blast.

2. During construction all overlapping joints, wherever metal is placed upon metal, should be thoroughly coated with a heavy mixture of moisture repelling paint.

3. The initial painting, being of the greatest importance, should be done in the best possible manner. The first coat should be applied immediately after metal has been sand blasted and before the cleaned surface can accumulate rust. The material should be of an elastic nature and sufficient time should be allowed between coats for drying. It should be put on evenly, in a workmanlike manner.

4. We believe that not less than three coats should be applied to all exterior parts of body, including underframing, and two coats on interior of body; also all parts of trucks, except wheels and axles.

5. We recommend a rigid inspection of the cleaning and painting of cars under construction by competent, practical men, believing this in the line of economy.

6. We would suggest that the abuse of cars in service be stopped by discontinuing the loading of hot slag, billets, etc. Also that the hammering of side sheets and other injurious methods used to facilitate unloading be discouraged.

7. In the repainting of cars, all corrosion and loose paint should be removed with steel scrapers and wire brushes or the sand blast, and not less than two coats of an elastic preservative coating applied to all cleaned parts.

As the greatest loss from corrosion is found on the interior parts of coal carrying cars, we would consider the matter of painting these cars worthy of serious consideration.

B. E. Miller,
J. D. Wright,
John F. Lanfersiek,
Committee.

—1871—

Preparation of Locomotive Tanks for Painting.

While the sand blast is generally recognized as affording the best method, all things considered, of cleaning off the old paint, etc., from the locomotive tank preparatory to repainting it, a great number of shops are not equipped with the sand blast, and some other method must be devised for accomplishing the work. In a good many shops the lime and lye process is employed, and so far as our information goes it is an effective and economical process—the next best, in fact, to the sand blast.

The mixture is made up of ten pounds of lime and about twelve pounds of any good railroad lye. Add the lime to the lye, stirring meanwhile, and then use a sufficient supply of water to convert the mass into a thick paste. Apply with a partly worn broom or trowel, making the application preferably at night, as the moisture prevailing at this time assists in keeping the mixture active and at work. The following morning wash off with water, using a garden hose and a scrub brush as necessary tools. Occasionally a second application of the mixture will be found necessary owing to unusual depth of pigment or to abnormal conditions existing in the composition of the old paint surface.

If the work is to be performed during the day it is a good plan to choose a cloudy day, for upon such days the lime retains moisture and works with a greater degree of certainty. It is not advisable, however, except in emergency cases, to wash off, or attempt to wash off, the mixture the same day of application. If applied in the morning or during the forenoon it is best to wait until the following morning before washing off.

In the preparation of the surface of a tank for repainting over old paint the practice in many shops consists of scrubbing the tank with a solution of sal soda, caustic soda, or concentrated lye, in water, after which wash clean with water, using pulverized pumice stone with which to reduce any existing warts and knuckles, and to make the surface fit generally for the reception of the pigment coats. Good locomotive tank painting depends, first and last, upon the preparation of the surface prior to the application of any pigment or other medium.

—1872—

Hard Putty for Car Work.

In the stock room connected with a large Eastern railway paint shop, posted conspicuously over the putty mixing bench, is the following formula for making hard putty:—

“Dry white lead, thirty pounds; bolted whiting, ten pounds; lampblack

(dry), one-quarter pound. Mix to a stiff consistency in equal parts of rubbing varnish and coach japan."

A good formula and one that will furnish a putty if applied right and placed over thoroughly seasoned timber, both non-shrinkable and non-bulging. After all, this question of putty reduces itself to the rather simple proposition of furnishing an absolutely dry and stable surface to apply the pigment upon, if uniformly satisfactory results would be assured.

—1873—

Putty for the Car Shop.

For all old or new surface work, the formulator suggesting a fair but critical trial for putty, with assurance that if followed up closely the practice will greatly reduce the usual putty bulging, shrinkage, chalking, fall out, etc.

Formula:—Ten pounds of standard body color of lampblacks in japan, two pounds of pure linseed oil whiting putty, two pounds of an eight-hour finishing varnish; all hammer stiffened up in floated whiting.

As a strong body color base of this hard drying putty always matches the color of finished work, it will be found especially advantageous for all touch-up and cut-in work. This putty will dry quickly and safely, cut free, smooth and solid under the stone.

Report of M. C. & L. P. A. Convention, 1908.

—1874—

Schedule for Quick Locomotive Painting.

The following schedule has been furnished by a foreman locomotive painter, as an example of the quick methods now in force for painting locomotives and tanks:—

First Day:—Clean, sandpaper and apply a coat of lead.

Second Day:—A. M.—Putty all defects of the surface.

P. M.—Rub putty spots, sandpaper and apply a coat of color.

Third Day:—A. M.—Apply a second coat of color.

P. M. Letter job and stripe, if necessary, and apply the first coat of varnish.

Fourth Day:—Apply second coat of varnish and black off as required.

—1875—

Protective Paint.

The following is a suggested protective paint formula, which consists of two ideal paint making specifications, the design of offering being to bring out expressions of opinion as to why the best grade of carbon black paints are not more generally used within the rush lines of the modern railway freight repair yard.

We will first suggest a formula for a high-grade, semi-paste carbon black weighing twelve pounds to gallon; the 54 per cent. pigment to be composed of 75 per cent. best commercial gypsum and clay combined and 25 per cent. best carbon gas black. The 46 per cent. liquid to be composed of 75 per cent. pure kettle boiled linseed oil and 25 per cent. strong turpentine dryer, ground fine.

If this class of semi-paste carbon black is reduced to one or two or three with a combined linseed and drying oil it will possibly dry set in good outdoor drying weather in twenty-four hours, but if chilled in drying process it may require from forty-eight to one hundred and twenty hours to dry set between coats, which, if stated facts, practically bars this class of paint for freight work in all outdoor seasons. Are these suggestion facts?

Report of M. C. & L. P. A. Convention, 1908.

—1876—

Semi-Paste Mineral Oxide Paint.

We will suggest specifications for a semi-paste mineral oxide paint. The pigment to be composed of 50 per cent. pure, finely bolted sesquioxide of iron and 50 per cent. best commercial gypsum and clay combined. The strong turpentine drier, ground fine.

This oxide paste, where reduced one to two or three with a combined linseed and drying oil, should stay up in a free application, cover strong in body, dry set in less than ten hours in all outdoor painting weather, which, if facts, conclusively shows why the quicker oxidizing calcines of iron as paint pigments are best adapted and more generally used in the railway car paint shop usually equipped with a sky roof.

Report of M. C. & L. P. A. Convention, 1908.

—1877—

Finishing a Caboose in Para Red.

What treatment is best in finishing a caboose in red, when the aniline color is ground in japan (referring to a certain brand of Para red) and varnished over? The questioner had considerable trouble with this color, but the railroad officials wish to retain it as the standard. A suggestion was asked as to the best way of handling it. A good lead base, and also prepared surfaces, have been tried, but in every instance the red seems to destroy the varnish above and the surface beneath.

We have heard of paranitraniline red "bleeding out" in white or other light colored lettering or striping, and have heard of the color being absorbed by the ground, but we had no idea that this red, when ground in the proper vehicle, would destroy the ground work or the varnish applied over it. Something must be radically wrong with either the pigment itself or the vehicle in which it is ground. So far as we know it is most essential that the materials required for its manufacture or for the development of the color are very caustic and that great care must be exercised in eliminating them by oft repeated washings of the finished pigment. In grinding the dry pigment it is of the utmost importance that the vehicle selected is of such a character that the binding properties are of the very best obtainable in a coach color so that the varnish will not sink into the color. A coat of rubbing varnish applied over the last coat of color and matted down before lettering or striping will prevent the finishing coat or coats of varnish from contact with the color. As for the ground work, while there is some doubt as to white lead making a good base, the safe way would be to use lead tinted with red (Indian red or red oxide) as a priming coat for a new caboose, then follow this up with one or more coats of paint made from Venetian red or Indian red, with just enough zinc white to give a pinkish tint. The oxide of iron paint will correct the brittleness of the zinc oxide. Or the caboose may be surfaced in the usual way and only the last coat of ground work made as above. If the red has not binder enough the operator can correct by adding some rubbing varnish to the color after thinning it, but this feature must not be neglected under any consideration.

—1878—

Statuary Bronze Finish for the Brass Equipment for Coaches.

For molding the castings to produce the statuary bronze finish the following metals are employed:—82 per cent. copper, 15 per cent. zinc, 2 per cent. tin, 1 per cent. lead.

After a casting is molded it is sand-blasted and then polished on the polishing wheel. Next it is immersed in a liver of sulphur dip made of one-half

ounce of liver of sulphur and one gallon of hot water, after which it is thoroughly scratch brushed and then coated with any of the standard lacquers used on brass finished in the usual way.

In preparing the old brass to represent the statuary bronze finish the brass is first copper plated and then dipped into the same solution mentioned above and finished all the way through the same as a casting. Dipping the old brass into the solution mentioned gives it a very dark bronze color—almost black, in fact. And this black effect runs even all over the plated brass. Being thus coated the fixtures are then put on the ordinary buffing wheel and buffed off in patches here and there to give them the peculiar and luxurious mottled effect characteristic of this style of finish. Buffing the brass in spots permits the copper to show through the otherwise dark finish.

—1879—

Repainting an Old Buggy.

The method pursued in this kind of work depends very much upon the desire of the owner of the vehicle and the price to be obtained. If the old paint is loose and flaky there is no other way than to burn off and build up anew from the wood up, in which case, in order to make a good job, it will require a priming of lead containing at least one-third oil, and another coat of flat lead, to be followed by puttying and sand-papering. Then two or three coats of roughstuff and one coat of flat color and one coat of color and varnish, to be followed by two coats of clear rubbing varnish and at least one coat of finishing varnish. This for the body. In the running parts the roughstuff is omitted and one coat of clear rubbing is sufficient over the flat coat of color and the color and varnish coat.

For a cheap or touching up job, where the old paint is firm and where the varnish only has perished or fissured the usual quick method is to thoroughly clean all parts of the vehicle, to give the body a light rubbing with pumice and water and the gear a good sandpapering, touching up the bare spots with a coat of lead color, followed by a coat of flat color, one coat of color and varnish, which is mottled down to permit striping where required, and one coat of finishing varnish. In cases where the paint is still firm and yet cracked, the surface should be gone over with glazing putty before the flat coat of color is applied.

—1880—

Primer and Surfacer for Carriage Work.

A good method for mixing priming and roughstuff for surfacing a new buggy was wanted.

The best priming is made from pure white lead in oil (keg lead), tinted with lampblack in oil and thinned with raw linseed oil, to thin consistency, say not over ten pounds of lead to one gallon of oil, and no drier should be added unless the job must be hurried, when a tablespoonful of coach japan may be added to each pint of the priming. Turpentine should be used only when the wood is very hard and then only sparingly. Apply the priming uniformly to every part of the vehicle and rub it in well with the brush. Then, for good work, apply a first coat of lead and lampblack, thinned with three parts of raw oil and five parts turpentine, adding one part coach japan to expedite the drying. On top of this apply a second coat of lead or flat lead, also made from white lead and lampblack, thinned to fairly stout consistency with turpentine, adding a tablespoonful of coach varnish as a binder to each pint of paint. The best roughstuff for light vehicles is made by mixing equal parts by weight of Reno filler and keg lead, kneading it into a thick paste, with equal parts of quick rubbing varnish and coach japan, or running the mass through a hand mill, then reducing it with turpentine to the consistency of varnish for application. Should be strained before use.

—1881—

Roughstuff for Car and Carriage Work.

There are numerous formulas for roughstuff, but the good-old-fashioned material is made by grinding together equal parts of Reno Filler, raw or burnt, as desirable, and pure white lead in oil by weight with a mixture of equal parts of coach japan and quick rubbing varnish to the consistency of a stiff paste. Reduce with pure spirits of turpentine for application with the brush. Two coats per day may be safely applied. For a well-surfaced job, four coats, not too heavy in consistency, should be sufficient. If three coats make a good surface, it is all the better for wear.

—1882—

Finishing a Carriage or Sleigh in Blue.

For a good job of blue on a carriage body, when the roughstuff has been rubbed successfully to receive the color coats, we would advise the mixing of the blue in japan, whether it be ultramarine, cobalt or a mixture of these and Prussian or Chinese blue, with turpentine to spreading consistency, adding a tablespoonful of finishing varnish to a pint of the thinned color for the first coat, permitting this coat to stand for at least twelve hours in a warm shop, or longer in a cold shop or shed, before the second coat is applied, which should also be thinned with turps, and a tablespoonful of quick rubbing varnish added to each half-pint of the thinned color. Three coats of rubbing varnish should be given, two of them to be full flowing coats with the body tilted and the first coat not as much surfaced as the second coat, the third coat to be given with the body in its natural position. In rubbing, use felt rubbing pads and direct the strokes lengthwise of the panel. Do not use too much pumice and water and only moderate pressure. Be very particular in washing up after rubbing to remove all traces of pumice, and before applying the finishing varnish rub again lightly to rid the surface of any scum or bloom that may have collected. In flowing on the finishing coat or coats of varnish be very careful after crossing to go over the panel only once in laying off. The less varnish is disturbed or brushed after being flowed on the higher its luster and finish.

As to sleigh painting, when four coats of roughstuff have been applied and surfaced, one coat of flat and one coat of color and varnish are given, and the stripes and ornaments should be placed upon this coat, and one coat of rubbing at least and one coat of finishing varnish given. The foregoing is for the body of a sleigh or cutter; for the running parts, after sandpapering, one coat color and varnish, on which the striping is done, is usually sufficient. After this one coat of rubbing varnish and one coat finishing varnish is all that is required.

—1883—

Bluing of Varnish on a Buggy.

What is the cause of blue coming out on top of the varnish on a new buggy? The bluing of varnish in carriage work is usually traced back to moisture and a cold workshop. This trouble is mostly superficial, and may be cured by repeated washings with cold water and subsequent drying with chamois skin and exposure to light and dry air.

—1884—

Carriage Top Dressing.

A good dressing is made by melting together one pint neatsfoot oil and two ounces beef suet. When done, add one teaspoonful of melted beeswax, mix carefully, strain and put into a can, which cork tightly until used. Apply with a soft sponge. This will do for rubber or leather tops and curtains. A little drop

black ground in oil may be added so as to hide worn places. A glossy dressing may be prepared by mixing one quart finishing varnish, one ounce beeswax, melted in turpentine and enough drop black in japan to give a good black luster. Thin with spirits of turpentine sufficient to give it good brushing consistency.

—1885—

Tan and Ox Blood Russet Color for Automobile.

What colors are required to produce a tan and ox blood russet effect on an automobile?

You can make a good tan color from say 10 parts by weight of burnt sienna, 3 parts raw umber and 4 parts medium chrome yellow, or you can make it from white lead, burnt sienna and drop black. It all depends on what sort of a tan is desired, as the color can be produced in a dozen different effects and yet be called a tan. Your colors should be ground in japan and thinned with turpentine for use. For the ox blood russet color we would suggest that you purchase a deep red body color, ground in japan, from a reliable paint house that has a large selection of coach colors. You will probably find that they show in their sample book the very color you require. By mixing a brilliant coach body red with a trifle of chrome yellow of the orange shade you should be able to produce the desired effect, but the red must be of a deep shade.

—1886—

Striping of Surfaces Decorated with Para Red.

An engine was decorated with para red, striping with aluminum bronze and light green, and after varnishing the stripes showed up rusty.

The only remedy is to rub the varnish with pumice and water and apply new stripes over the flatted varnish. Then varnish over again. The discoloration of the stripes is not due to the varnishing, this operation only tending to show it up more prominently. The para red must be protected by or mixed in all varnish in order to avoid this discoloring.

—1887—

Paint Blistering on Locomotive Cabs.

Cabs of locomotives, painted in a cold, damp place, blister, except on panels of poplar. Blistering always occurs on panels made from old sills of cars no matter how the paint may be mixed. The painter who meets these difficulties **also wants to know** the best method of mixing paint for locomotives. In view of these facts we think the blistering due to the damp atmosphere in part and partly to the use of shellac. That blistering does not occur on panels of poplar we would attribute to the fact that poplar is a very soft wood into which the shellac varnish sinks more deeply, giving a less glossy surface than it does on the hard panels made from old sills. For the latter purpose we would suggest that shellac varnish as a first coat be discarded and instead given a thin coat of lead color, made from keg lead and lampblack, thinned with half oil and half turpentine, adding a little coach japan. Let this stand a few days, if possible, then give one coat of flat lead color, made from keg lead and lampblack, or drop black ground in japan and thinned with turpentine only. This dry and hard, fill up with knifing lead, where necessary, and putty up. If the job is to be rubbed apply your guide coat and rub next day. Then give two coats of color ground in japan, thinned with turpentine, or, if it must be, your two coats of color and varnish, but we prefer the former, it being less apt to blister. If the outside surface of the cab is not in bad condition one coat of lead color, flat, is sufficient; but for new work or where the old paint has been removed two coats of lead color and two coats of knifing lead cannot well be dispensed with. On the inside

of the cab such great care is not required. This can be washed down, a coat of shellac varnish given, and right on top of this a coat of color in japan and one coat of finishing varnish.

The painting of the tank is practically the same as for the outside of the cab, with the exception that the surface must first be freed from scales and rust before the lead color is applied.

The trucks under the tanks, after being cleaned from oil and grease with benzine, may be given a coat or two of good black and varnish. The smokestack is best coated with lampblack in oil and japan when the engine is in steam, so that the coating will bake on, as that will prevent blistering. The boiler, while still hot, should be given a coat of pure linseed oil, and right on top of this, before becoming too hard, a coat of dry red lead mixed with keg lead and oil. All other parts—the dome, sand box, driving wheels, fire box and frame of engine—should have a few coats of lead color, same as on the cab, then be filled and coated with drop black in japan and varnished or finished with locomotive black.

—1888—

Cleaning Cars for Revarnishing.

An opinion was asked as to the merits of a weak solution of sal soda in water for cleaning the varnished parts of cars, etc., that are to be revarnished. The solution had been used with powdered pumice for rubbing and cleaning the surface, which is painted light buff and golden ocher, and this was followed up by a thorough washing with hose, water and brush.

You fail to state what experience you have had with your method of cleaning the cars with your soda solution and pumice stone, but as you simply ask our opinion on the use of soda, we will say that we prefer the use of good soap in place of the soda solution. We consider the following method the quickest and safest for preparing a car for revarnishing:—Good soft soap, water, pumice stone No. 2, a good stiff scrubbing brush of Palmetto fiber, if possible, a bunch of curled hair, a piece of soft wood to clean out corners, chamois skin and plenty of never-tiring elbow grease are the necessary materials and tools for good and quick work. When the surface has been carefully cleaned the hose may be used, but the surface should be wiped with the chamois skin and no water allowed to remain anywhere. Before revarnishing all loose paint should be removed from battens, corners, moldings, etc., and the whole surface lightly sandpapered. After dusting, a coat of hard body varnish, reduced with about one-fourth its quantity of turpentine, should be applied, and when this has dried all bare spots should be touched up with quick drying color to match and then puttied. When putty is dry, cut down with lump pumice, and follow by rubbing the puttied spots with powdered pumice, felt and water. Now the car is ready for touching up with color where needed, but it is often better to repaint the whole car before revarnishing, at least to give it a coat of color and varnish.

—1889—

Dyeing Car Seats Without Removing Plush.

We have received a communication from a brother craftsman in Canada, who says that he has had experience in that line and found the following plan to work out satisfactorily:—When the plush was not too much blackened and the nap or pile not too much worn, the seats were made as bright and clean as new. First, a thorough scouring with a good stiff brush dipped into a solution of one ounce concentrated lye to a pailful of warm water was given to remove all grease. Then a second scouring with vinegar to counteract the alkaline properties of the lye was given, which also acts as a mordant for the dye, as our grandmothers used to do in their days when dyeing cloth, namely, add a few drops of vinegar to set the dye. This is done on one day and next morning the same brush is used for applying the dye, which is placed in a shallow dish,

the brush dipped into it and the plush, as it were, scoured with the dye. Our informant, who, for obvious reasons, does not wish to have his name appear in print, further says that he has spoken to the manager of a dye works, who informed him that the method would be followed if he had similar work on hand, and that any good red dye of the proper hue would do the work.

—1890—

Glazing Putty or Knifing-in Lead for Car and Carriage Work.

To prepare this properly, you must be sure to use keg lead, that is pure white lead in oil, and none of the so-called white leads. A corroder's brand on the head of the package will give you the assurance of purity. To prepare 100 pounds of the material, mix in a suitable tub with a stout paddle (unless you have a powder mixer) 65 pounds keg lead, 25 pounds dry white lead, one-half gallon pale coach japan, one-half gallon pale rubbing varnish and one quart spirits of turpentine, and run through a paint mill until fine. This will be of the consistency of soft putty and should be applied with a stiff brush to the parts of the car or carriage, and when it has deadened or flattened, is to be gone over with the putty knife, with which it is pressed into the pores of the wood, and the surplus removed. In other words, it is used as a putty to fill up, and care should be taken not to have any ridges or surplus glazing putty anywhere on the work, being especially careful of the moldings around panels or where irons and wood are joined, because the jar of the vehicle when in service is liable to shake the putty loose. For cheaper grade of work, finely bolted whiting may be employed to replace the dry white lead, but the amount of japan rubbing varnish and turps will have to be doubled.

—1891—

Enamel Top Dressing and Leather Carriage Top Preservatives.

The very best enamel top dressing that we know of, and which is not so very expensive, is prepared as follows:—Dissolve in an iron kettle over a good fire, say, 25 pounds of high-grade asphaltum, Syrian or Gilsonite, in one and one-half gallons of varnish makers' litharge boiled oil; add 50 pounds burnt Turkey umber, that is ground fine in boiled linseed oil; stir well, and add one and one-half gallons more of varnish makers' litharge boiled oil; then boil the mass until it attains body, take from the fire, and when nearly cold, thin with sufficient quantity of turpentine to produce an easy flowing varnish or enamel.

The varnish makers' boiled oil should contain from one and one-half pounds to two pounds of litharge or red lead to the gallon of oil, and be of heavy body. The boiling of the preparation should be done in a moveable kettle and closely watched, as asphaltum and umber mixture readily boil over. The operation should not consume over two and one-half hours.

A good waterproof leather preservative for carriage tops is made as follows, the parts referred to being all by weight:—18 parts of yellow country beeswax are melted, and to this one part pulverized borax is added, and the mass stirred until a thick jelly has formed. In another kettle or pan 6 parts spermaceti is melted, and into this is stirred 5 parts of asphaltum varnish thinned with 60 parts of turpentine, then the wax and borax jelly is added and the whole mass thoroughly stirred. Now 5 parts of vine black and 2 parts finely powdered Prussian blue are rubbed smoothly with part of the mass and then added to the same while still warm. Perfume with oil of myrbane (nitrobenzol) and put into well closed cans. Apply with cloth in small quantities, and rub out well, polish with a brush. Do not apply it too often.

Mr. M. C. Hillick gives the following formulas for leather top preservatives:—

No. 1.—Neatsfoot oil, 1 pint; beef suet, 2 ounces. Melt the oil and suet together. Then add a tablespoonful of melted beeswax, mixing all well together, and bottle. The beeswax has a cooling property greatly to be desired in a leather preservative.

No. 2.—Darken neatsfoot oil with drop black. Apply sparingly and rub out with soft rags. This does not give the brilliancy of finish that an enamel dressing does, but it gives to the leather a softness and pliability that cannot be obtained otherwise.

—1892—

What Is Roughstuff and What Is It Used For?

Roughstuff is used by the carriage painter, the car painter and to some extent by those that paint and ornament very fine machinery. Its mission is to give an even, uniformly hard surface that may be rubbed down with pumice stone and water to a level on which the ornamenting color and finishing varnishes will stand out like a mirror. It is made in various ways, but here are a few of the most common formulas:—Equal parts by weight of Reno's filler and keg white lead are mixed with enough quick rubbing varnish and coach japan, equal parts, to make a medium stiff paste, which is thinned with spirits of turpentine to brushing consistency. Or two pounds keg white lead and five pounds English filler are mixed with equal parts best rubbing varnish and coach japan to a stiff paste and thinned with turpentine for the brush.

—1893—

How to Prepare Color, or Paint, that Will Not Crack or Peel Off Rubber Cloth of Carriage Tops.

Make a mixture of one gallon best body finishing varnish and one-quarter-pound yellow country beeswax that has been dissolved by heat (in a water bath) in one pint of pure spirits of turpentine. Before mixing the two, the varnish should be placed in a tin can which is also warmed up in hot water, so as to make the solution of beeswax and turpentine amalgamate more intimately with the varnish. Now break up two pounds of drop black, ground in japan or rubbing varnish with enough spirits of turpentine, then gradually, while constantly stirring, add the mixture of finishing varnish and beeswax solution. If this does not flow out well from under the brush, add more turpentine until it does. As a matter of course, before this preparation is applied the rubber must be well cleansed by sponging with soap and water, rinsed with clear water, dried with a chamois skin and allowed to dry thoroughly afterward. If any other color than black is desired, mix in a similar manner as that above given, changing proportions to suit the nature of pigment composing the color employed.

—1894—

How Roughstuff May Be Kept in Good Condition.

Mix your roughstuff to a stiff paste, and after taking from it the quantity immediately needed put the balance into a white lead keg, level the roughstuff down nicely and cover it with a piece of stout paraffine or parchment paper, which will exclude the air. Or a little turpentine may be put on top of the roughstuff and a piece of oilcloth tied securely over top of keg. By following either of these methods the filler can be kept for a long time. When mixed thin, ready for use, and allowed to set around it soon becomes gummy, stringy and worthless.

—1895—

Repainting the Body of a Carriage Without Removing the Old Paint.

Scrape off all of the varnish down to the color coats with a carpenter's scraper, about two inches wide, then cut down with sandpaper until you have a fairly smooth surface and dust off. Now give a coat of white lead, tinted with lampblack and thinned with one part japan, one part oil and two parts turpentine.

Allow this to stand forty-eight hours, and putty up where required; then give another coat of rough stuff and putty up again. After this give two more coats of rough stuff, apply your guide coat and rub, proceeding as you would on new work. By this method you will fill up whatever cracks there may have been in the old color coats, and obtain a good wearing job.

—1896—

Finishing a Coach Panel.

We prefer the old time system of lead priming, omitting varnish in the first coat, unless the work must be hurried at expense of durability. Have your panel well smoothed with sandpaper and dusted, then apply your first or priming coat, made from pure white lead in oil, the so-called keg lead tinted to a light or dark lead color with lampblack in oil, thinned for the brush with raw linseed oil of undoubted purity, adding to each pint of the liquid paint one or two tablespoonfuls of good coach japan. Make this prime fairly thin, so as to penetrate well into the wood. If the wood is rather dry and close grained a small portion of turpentine in addition to the coach japan will do no harm. Apply this priming smoothly and uniformly all over the panel and give forty-eight hours at least for drying before applying the next coat. Now apply what coach painters call the first lead coat, which should be again mixed from keg lead, tinted with lampblack in oil, as fancy may dictate, thinned with one part raw linseed oil and three parts of turpentine, to which a small portion of coach japan may be added, but not over two tablespoonfuls to one pint of the liquid paint. This is held somewhat stouter than the prime so as to cover up. The second lead coat comes next, having given the first coat at least twenty-four hours to dry, or if the shop be cold or the atmosphere damp, thirty-six to forty-eight hours to dry hard. This coat should be keg lead, ground fairly stiff, tinted to suit with lampblack in oil and thinned with turpentine only, adding a tablespoonful of coach japan to one pint of the mixture. Should be applied with a camel's hair brush. Remember that every lead coat, even the priming, must be sandpapered lightly. Use No. 1 sandpaper on the priming, No. $\frac{1}{2}$ on the first lead coat, and No. 0 on the second lead coat, followed by mossaing with curled hair. We do not recommend the rub-lead system, as it is not conducive to the health of the operator, hence we suggest the old-time roughstuff for surfacing over the lead coats. This is best prepared by mixing three parts English filler with one part keg lead, using equal parts coach japan and coach rubbing varnish to make a moderately stiff paste, running it through a mill until fine, then thinning for application with turpentine to the consistency of flowing varnish. As it sets quickly it must be applied deftly with a good chisel-edged varnish brush. Brush marks must be avoided and it is best to apply a greater number of coats than to save in the number and have brush marks to rub down. Three coats at least are required, sometimes more. When the last coat of roughstuff that has been tinted to the color of the finishing coat as nearly as possible has dried, a guide coat of ocher or Venetian red mixed with some of the roughstuff and made rather thin with turpentine is applied over the surface, which is then rubbed with pumice and water, until the operator finds by passing the palm of his hand over the surface that it is perfectly smooth and fine. This stage having been reached, the panel must be carefully washed with sponge and water and dried with chamois leather and every vestige of pumice removed, using a pointed stick around moldings. This done the coach color selected is applied, thinned with turpentine and of this at least two coats are required, to the last of which a small portion of rubbing varnish may be added. When this coat has thoroughly dried it may be mossaed lightly and then a full coat of best coach rubbing varnish given, which may again be mossaed instead of being rubbed. Two coats of finishing varnish will suffice, the last coat to be a flowing one. We cannot suggest the name of any one brand, as that depends upon the price you can afford to pay for the work in hand. All we can say, that if you wish to do a first-class job you must be sure to procure the very best and pay the price for the goods accordingly.

—1897—

Re-dyeing Car Seat Cushions.

Can passenger car cushions be re-dyed without removing the plush, and if so what materials are used in the process.

The re-dyeing of passenger car cushions without removing the plush is a practice prevailing in practically all shops where coach repairs are looked after. In such shops the dust is first removed through the medium of the vacuum cleaner, or by blowing it out with compressed air. The latter is an unusually rapid and effective method, but properly should be used in a room specially designed for the work. The dust having been removed, the next process consists in cleaning and re-dyeing the plush, the two items of work being accomplished at the same time. Formerly the plush was dyed with aniline dyes. At the present time this class of dye has been superseded by acid dyes furnished in the variously required colors by dye makers. To dye the plush crimson use

Of clean water	40 gallons
Sal soda	6 ounces
Common salt	3 ounces
Ammonia	1 gill
Crimson acid dye	1½ tablespoonful

For scarlet simply substitute the scarlet acid dye for the crimson. For old gold substitute the old gold acid dye.

In case of the green dye, observe the above formula with the substitution of the green acid dye and the addition of a very small quantity of muriatic acid.

The above formula will provide sufficient dye for a coach, containing say, from 35 to 37 seats.

Preparation of the dye:—Pour the proper quantity of dye into a small cup containing water at the boiling point, mixing thoroughly. Then into the large quantity of water maintained near the boiling point, and containing the necessary ingredients, pour the dye, continuing the mixing until a smooth, uniform solution of perfectly incorporated parts is obtained. The proper mixing of the dye is, if anything, the most important step in the process.

Method of application:—Keep the dye hot and apply to the plush with a scrubbing brush. After applying and working the dye well into the warp and woof of the plush, immediately rinse off with clean, cold water, applied either with a sponge or through a hose. Next, with compressed air, proceed to blow the water out of the plush, leaving it fresh, clean and with an entirely new color. In the absence of compressed air take a thin, smooth strip of hard wood of sufficient length and work it back and forth rapidly across the plush to remove the water, using a dry sponge also. Under this treatment the plush will sometimes take on a matted appearance, which may be relieved by going over the goods with a brush, this operation having the effect to lift up and readjust the nap of the plush to a condition approximating new fabric.

Explanatory:—The quantities of ingredients noted in the mixing formula above given cannot, or, rather, should not be adhered to in all cases. As, for example, the plush on a certain lot of cushions may chance to be in an uncommonly dirty condition. This will call for a little increase in the quantity of sal soda. Or perhaps the condition will permit decreasing the quantity stated. The worn and faded condition of the goods, moreover, may require a stronger dye, in which case the quantity of this ingredient must necessarily be increased.

Practice, experience and a strong percentage of good common sense are needed in measuring up to the full requirements of the work.

—1898—

Preventing the Bulging of Putty in Car and Carriage Work.

The most successful putty we know of for filling in screwholes was made as follows:—20 pounds dry white lead, one pound bolted Cliffstone paris white, one ounce dry lampblack, 2 pounds (one quart) coach japan, 1 pound (one pint)

rubbing varnish, run through a paint mill. Allowed to stand in a can for 3 days, then taken on a block that was sprinkled with fine whiting and beaten with a wooden maul. When used for filling screwholes the putty was firmly pressed in with a spatula dipped into turpentine. The bulging of putty seems to be caused principally by the sweating process going on after filling the holes.

—1899—

Keeping Automobile Finishing Room Clean.

The automobile finishing room should be very plain and simple in its appointments. The furnishings should be limited to those things actually necessary to facilitate the work. There should be plenty of light and plenty of ventilation, both of which contribute toward keeping the room and its belongings clean. Ceiling and side walls to be preferably of matched lumber, finished up on the natural wood, or painted ivory white, as the individual party in authority may elect. In either case, the finish should be such as to permit, if desired, washing down. The floor likewise to be of matched stuff, tight and sound.

To keep the varnish room clean, not only when varnishing, but at all times, use a good vacuum cleaner, of which there are numerous makes. This device not only sucks up the dirt from the floor, but the dust and accumulations from side walls, ceiling, window sills and all other places are taken up without fuss or annoyance or redistribution of the offending matter. It is the strictly modern method of cleaning and solves a long-standing problem for the finisher. The matter of keeping the varnish brushes clean simply resolves itself into an affair of providing dustproof keepers stocked with a nice elastic grade of finishing varnish secured from the manufacturer and containing no driers. Break the new brushes in on applying rubbing varnish, and as soon as their cleanliness has been established beyond question pass them on to the application of the last coats of rubbing and finally to the finishing work itself. Keep the finishing brushes in a keeper separate from the brushes used in rubbing varnish, and store all the brush keepers in a cupboard against the wall and several feet from the floor. Suspend the brushes in the preserving medium well up over the bristles, thereby maintaining a clean condition of the stock and promoting its elasticity.

—1900—

Grinding Quick Drying Blues for Coach Painting.

A painter had experienced difficulties in grinding pure blues, such as ultramarine, imitation of cobalt blue and Prussian blue in japan, the finished product always being stringy in the package, instead of coming out in buttery consistency, like other quick-drying colors that are ground in the same vehicle. Would be pleased to have our suggestion as to how this can be overcome without slowing up the drying of the color in drying, when applied in practice and without destroying elasticity and the wearing quality of the goods.

The stringy condition of the blues, after grinding in japan, is chiefly due to the nature of the pigment, especially in the case of the ultramarine blue and the cobalt blue, which latter is also of similar nature to ultramarine. When the composition of the blues is considered, it is at once evident that sharp mills are required, well water-cooled, in order to create as little heat from friction as possible, so that the volatile parts of the japan will not evaporate in too great an extent, thereby causing the japan in the paste to become gummy or ropery. Ultramarine blue and cobalt blue are composed of silica, kaolin (clay), sulphur, soda and a small percentage of water. If there be any free sulphur present it will act upon the japan during the mixing and grinding process, tending to saponify part of the linseed oil in the japan. With Chinese or Prussian blue the difficulty is that it often becomes rather refractory on drying, and requires many runs through the mills before it becomes fine enough for coach work. Some color grinders use quick-drying rubbing varnish with a portion of turps for these

pigments, but if you wish to continue with your grinding japan, we would suggest that you grind the paste as stiff as possible, until fine, then run once more through the mill well opened, with enough rubbing varnish to make the paste "buttery."

—1901—

Repainting an Automobile.

To make a good job of painting and finishing an automobile from which the old paint is coming off in spots, proceed first to burn the old paint from the body with a gasoline, hand-burning torch or lamp, or, better still, if you have it, with a compressed air burning device.

Get right down clean to the wood and sandpaper the surface until all charred particles of pigment and other foreign substances are entirely removed. Then coat with a primer consisting of five parts raw linseed oil and three parts turpentine, with a spray of coach japan to make everything sure, using enough oil ground lead and some other pigment to color up the mixture.

In due time apply a second coat of the linseed oil and turpentine and lead mixture, using one part oil to three parts turpentine. Color the lead in the direction of the final body color chosen for the car upon this coat. When dry, putty all existing surface fractures with a hard drying putty made of three parts dry white lead and one part bolted whiting, and equal parts of coach japan and quick drying rubbing varnish.

Clean up the chassis meanwhile, and after sandpapering thoroughly apply a coat of this second coat lead mixture, upon which, when dry, putty as required with the quick drying putty as above noted.

The lead coat on the body having dried apply four coats of roughstuff in as many days, making this stuff of equal parts by weight of white keg lead and any good American roughstuff filler, working the pigments to a heavy batter in equal parts of coach japan and rubbing varnish, then, with turpentine, thinning to the proper working consistency, which should always be a little heavier than ordinary paint consistency. Rub the surface down level and smooth two or three days after applying the last coat of stuff with artificial rubbing stone or brick and water, permitting the rubbed surface to dry over night for the purpose of evaporating moisture. Then sandpaper lightly, dust off and apply a coat of color, then a coat of varnish color, then a coat of clear rubbing varnish or rubbing varnish containing a bit of color in it to maintain the purity of the original color, giving time, of course, for these coats to dry right, a matter which local circumstances and conveniences must govern. With water and pumice stone apply whatever striping and ornamental work is required, clean up and apply a coat of clear rubbing varnish. When dry rub this coat down with water and pumice stone flour as before, wash up carefully and finish. In the meantime fetch the chassis along from the lead coat above mentioned by sandpapering this coat in due season and applying a coat of "dead lead," i. e., a lead containing one part oil to six parts turpentine, with enough color in it to bring it along well toward the final color. Sandpaper this coat down nicely, lay on a coat of the right ground color, then a coat of varnish color, rub lightly, stripe and apply one coat of clear rubbing varnish. Rub this with water and pumice stone flour, clean up and finish along with the body.

Naturally, if any of the glaze pigments or the cakes are employed a ground coat of color and an extra coat of the glaze pigment will be in order for strictly A1 results.

With reference to the paint, color and the varnish to be used in bringing the automobile to a finish, we refer our correspondent to the advertising pages of the magazine wherein a dozen or more reliable firms catering more or less directly to the automobile are listed.

M. C. H.

—1902—

Tempering Colors Ground in Japan with Oil.

How much raw oil should be added to coach colors in japan that have pigments that are natural driers in order to impart elasticity to the color and stop it from checking or cracking?

That depends very much upon the kind of japan that the colors are ground in by the manufacturer, also upon the time allotted for the drying of the various coats. Oil is often added, more for the purpose of increasing the binding properties than for increasing elasticity and durability. Some railway companies specify the colors you have reference to, to be ground in one-third raw oil and two-thirds japan, only desiring the slow drying pigment ground in all japan. But the colors for the carriage trade are usually ground in straight japan or varnish, as the case may be, as delicate colors like chrome yellow, etc., would be badly discolored if ground in coach japan. An expert carriage painter of wide reputation suggests that in all cases where work need not be unduly hurried, one part raw linseed oil to every nineteen parts of turpentine should be used for thinning the general run of coach colors.

—1903—

Removing Paint and Varnish from Automobiles.

The patented quick acting paint and varnish removers mostly contain both wood alcohol and benzole or solvent naphtha, as well as acetone, and although most of them act pretty much alike in their resolving properties, we have good reason to believe that none of them are based on exactly the same formula as to the proportion of the various ingredients. It is safe to say, however, that wood alcohol and benzole combined will act more quickly as a solvent than either of them alone.

—1904—

Best Paint for Priming Automobile Bodies.

There is quite a difference of opinion on the subject, many painters still preferring a primer of pure white lead in oil, thinned to brushing consistency with raw oil and turpentine and very little coach japan in the way of a drier. This, we believe, a very good foundation to place rough-stuff on, while we should not recommend all oil for thinning, and if the metal surface, be it steel or aluminum, is roughened, it will hold on well. The principal feature is that the first coat is thoroughly dry before recoating, and while many painters believe in special primers suggested for the same purpose, we are of the opinion that a properly made white lead primed cannot be excelled.

—1905—

Black Japan for Carriage Bodies.

Will black japan serve as well on carriage bodies as does color and varnish, and will this black japan stand the mud as well as a good black rubbing varnish and not crack or chip off?

On general principles we would say that in a black finishing japan the pigment displaces some of the varnish that imparts life to a rubbed surface when applied as a clear body over the latter, unless a clear varnish coat is also placed over this black japan. But the question after all hinges on the quality of the goods, and a so-called black japan may last longer than many clear finishing varnishes. Still, we believe, that several coats of finishing varnish over black rubbing varnish will wear best in the long run.

—1906—

Composition of Battleship Gray for Auto Cars.

This color is best made from white lead, such as is ground for car and carriage work, with lampblack ground in japan for the tinting material. We cannot give exact proportions, because the various brands of lampblack vary very materially in strength. We should say that you try one pound of lampblack to twenty-five pounds of lead, and if the color thus produced is not blueish enough add a trifle of Chinese and Prussian blue in japan. Battleship gray, as we know it, is of the blueish type of gray, but do not use ultramarine blue, as it does not wear well in combination with white lead.

—1907—

Putty for Automobile Work.

Recipes for making putty for use in automobile work, hard putty and glazing putty as well:—

Some time ago there was published the following formulas for making putties of the kind you desire, which we believe to be an excellent material if you follow directions and use judgment in preparing same:—Hard putty, three parts dry white lead and one part best bolted whiting, by weight. Mix to a condition that will admit of free handling in equal parts by measure of coach japan and quick rubbing varnish.

Hard putty for the chassis, two parts white lead in oil, one part dry white lead and one part best bolted whiting, by weight. Mix to the right consistency in equal parts of coach japan and rubbing varnish.

Putty for deeply torn and badly shattered chassis, to go without sandpapering, one part white lead in oil, two parts dry white lead and one part best bolted whiting, by weight. Mix to proper consistence in equal parts, by measure, of thick varnish bottoms and raw linseed oil.

Putty for shallow dents and bruises in either body or chassis, one part pulverized pumice stone No. 00, two parts each of dry white lead and bolted whiting. Mix in ordinary glue water and use immediately after mixing. Test first to see whether your glue solution is strong enough to bind. Do not use more putty than is absolutely necessary.

—1908—

Some Carriage Painting Questions.

1. What do you think about using white lead and one-third zinc to paint wood and metal parts of carriages and autos for the first two coats? Will this kind of paint dry quicker than lead alone, and wear as well as lead primer? I have been using pure lead, thinned with three-fourths lead and one-fourth turpentine and a little japan, but it hardens slowly. Will Sipe's japan oil and one-third raw oil do for carriage painting?

2. Will red lead do to prime metal and wood auto bodies with? Is it as good as white lead for this purpose, or better?

3. What is the best kind of a varnish brush to use to put on the finishing varnish on the bodies of autos and all finely finished work?

4. What is the cause of varnish having brush marks when finishing varnishes put on over a smooth surface? No brush marks show until after the finishing is placed on the body.

Answer 1. The first two coats on the wood or metal surface of carriages and automobiles should contain no zinc white in their composition. A refined oil ground white lead, mixed for new wood surfaces in three parts raw linseed oil—including in this proportion the quantity of oil used in grinding the lead—and one part turpentine, the lead being cast to a slate color with lampblack, will make a reliable and durable primer for wood surfaces. The second coat should carry one part raw linseed to three parts turpentine.

In both first and second coats add a teaspoonful of pale drying japan to each pint of thinned paint.

For metal surfaces we would advise the use of a metal primer which numerous advertisers in *The Painters Magazine* will be pleased to supply.

Numerous metallic paints are now on the market which, mixed with two-third Sipe's japan oil and one-third pure raw linseed oil, will furnish durable results as a first and following coat upon the aluminum or steel surface. The negative condition of the metal surface should always be taken into account when preparing a first or priming coat to be used upon it.

An over supply of oil upon such surfaces will more often than not prove their undoing. Comparatively little oil will, under present conditions of trade practice, go a long way.

2. For the metal carriage or automobile body red lead ground in oil, just previous to use, and mixed in pure raw linseed oil nicely settled, strained thoroughly and applied without the addition of driers, will produce in the course of a couple of days' drying a very hard, tough and elastic foundation. It has been used and is being considerably used as a primer upon metal automobile bodies. However, for the wood body white lead or any of the patent process primers are to be preferred.

3. A full elastic flat bristle brush two and one-half inches or three inches wide, of best quality, with a one-inch single thick chisel badger hair flowing brush to run moldings and slick up edges.

4. Brush marks are sometimes worked into the surfacing coats, or into the color coats, and lastly, and possibly more frequently, into the rubbing varnish coats. In the surfacing or color coats, they are usually due to using the coats too heavy in body. In rubbing varnish coats they are due principally to overworking the varnish, or in other words, brushing the brush marks directly into the varnish from which they can in no wise be rubbed out.

To prevent the appearance of brush marks use coats of pigments mixed to a nice flattening consistency, and apply the varnish by brushing a flowing coat onto the surface, dressing it off quickly, and then letting it flow to a smooth and solid body.

M. C. Hillick.

—1909—

Preparing Colors Ground in Japan for Application.

Colors ground in japan are as a rule thinned with spirits of turpentine for spreading, so that they may be applied in very thin films, evenly and uniformly. When properly ground and thinned as above, the film dries to a dead flat surface upon which the varnish coat or coats take a good hold. The proper way to prepare the paint for use is to take a portion of the color from the original package into a clean cup of proper size and beat it with a spatula to buttery consistency, gradually, while still continuing the beating, adding the turpentine little by little until the consistency of thin varnish has been reached. Then put the thin color through a paint strainer to free it from any particles of skin or little lumps, and for fine grades of work it should be sifted through several thicknesses of cheese cloth. For some work where elasticity is desired and no particular rush to finish the work is required a few tablespoonfuls of rubbing varnish may be added to each pint of the thinned color, while some painters prefer to use a very little raw linseed oil to varnish in order to give free working to the color. In some shops turpentine substitutes are used for thinning, but we would caution against the practice if trouble is to be avoided.

—1910—

Coach Painters' Gold Bronzes for Striping.

What is Vernis Martin and for what purpose used? Can it be used for coach striping in place of striping bronze? Is it more durable than ordinary bronze? What liquid is used with it?

Vernis Martin is not a bronze, but a colored varnish used on gilt picture

and mirror frames, and, therefore, not suited for coach work. You cannot expect any bronze powders, at cheap prices, to be as durable as the genuine gold leaf. There is a French gold bronze that is made by grinding waste gold leaf in honey, then washed with water to remove the honey, and dried and used in powdered form like ordinary bronze, which will equal the durability of the leaf, but we doubt that it is sold at a low price. Why not stripe with imitation of gold color instead of bronze? Locomotive and car painters do their striping in that way with color ground in japan, and produce excellent and durable results, the effect being really richer than those obtained with striping bronzes, which, even when protected by varnish, will soon blacken on exposure. Flake white ground in varnish, tinted with lemon chrome yellow and a trifle of vermilion, makes a good imitation of gold color, and most manufacturers of colors supply such color in tubes.

—1911—

Baking Ovens for Automobile Paint Shops.

Of what material are the so-called bakeovens for baking paint or varnish on auto parts constructed, and how is the heat applied to the oven? In the finishing of automobiles I understand best results are obtained by baking the paint or varnish. Should every coat be baked or only the finishing coat of varnish? Will ordinary finishing varnish serve the purpose? What is the advantage of the bake oven?

Paint shop bake ovens are usually constructed of black sheet iron of a weight that conforms to the size of the oven, provided with iron racks on which to place the painted or varnished metal, be it steel, aluminum or heavy tin that is to be baked. The advantage of baking enamels, baking japans or baking varnishes is apparent when it is considered that a varnish or enamel of great elasticity, that would not dry to the touch in the ordinary temperature of a shop inside of three or four days, will be hard inside of say six hours when subjected to the right temperature in an oven, and in this way will adhere to the metal so tenaciously that a light blow with a hammer will not visibly affect it. Of course, ordinary finishing varnish will not serve for baking; the material must be made specially for the purpose. Nor can the baking be done on the finishing coat only; it must be done coat for coat, from the ground up, because if the undercoats are air-dried and the final coat only submitted to the high temperature required, the vehicle in the undercoats will become active from the heat and produce blistering.

As to the heat introduced into these bake ovens, that depends on the facilities or the location of the shop. The best fuel is gas, which is introduced in the form of jets in the bottom of the oven, but can also be done in a similar manner by burning gasoline or by live steam coils. Gas or gasoline, however, gives best results for regulating temperature. While we can see the advantage in time gained by baking the paint or varnish on the metal parts of automobiles, especially in an automobile factory, we can hardly see the necessity of a bake even in an auto repair shop, unless it is equipped for a great volume of work, as in most cases the metal parts will not be removed.

—1912—

Removing Old Paint from Automobile Wheels.

To clean up the wheels and chassis of automobiles it is recommended by M. C. Hillick to saturate the greasy parts with crude oil and turpentine or with kerosene, and let these softeners do their work for some hours. Then with a sharp putty knife, scraper, wire brush and cotton waste rub the grease off, and finish by washing the surface well with turpentine. If the paint is then in condition to be painted over with a fresh coat of color and finished with varnish, it would be unwise to remove it clean to the metal, while otherwise scraping and wire-brushing with the aid of ammonia or soap will clean it up so as to receive new paint after having been well washed and dried. For use on the frames,

would suggest pure red lead for the priming coat, to be followed by a few coats of lead roughstuff. The red lead to be mixed at the rate of thirty pounds dry red lead to three quarts raw linseed oil and one quart turpentine. The best black for a good dark-gray tint with white lead is well-calcined lampblack, producing a bluish gray, while bone black or drop black produces a dull gray of a brownish tinge.

—1913—

Finishing Aluminum Auto Bodies.

For a new aluminum automobile body, the first process consists in carefully rubbing the surface with emery cloth, or scour with No. 1½ sandpaper. Dust off and apply a coat of metal primer. Following the primer, in due season, cover the filling coats, etc., and after rubbing the surface with water and artificial rubbing stone, the color coats, varnish coats, etc., are applied. *M. C. H.*

—1914—

White Lead and Zinc White Paste in Oil for Interior Flat Finish.

A white paste that is claimed to consist of 60 per cent. white lead and 40 per cent. zinc oxide, ground in linseed oil, was used. When thinned with linseed oil, it works very tough and does not cover up well. When used for interior work, on walls that were painted before, it is necessary to use too much turpentine.

If the article is strictly pure lead and zinc in the proportions named, the maximum amount of oil for thinning 100 pounds to a paint of good hiding power should not exceed five gallons, which would produce about eight and one-half gallons of paint ready for use. That the paint works hard or tough may be due to the paste being in stock too long, as zinc oxide often acts badly when ground together with lead. As for its use for interior flat finish, it may be ground too soft to admit of the addition of linseed oil and at any rate we cannot see how you can produce a flat effect, no matter how much turpentine you add in addition to the oil. Shop mixture of white lead and zinc flat wall finish are out of date and you had better try one of the interior flat wall finishes offered by most every paint manufacturer in the United States.

—1915—

Removing Wax from Automobile Bodies.

Use pure spirits of turpentine and a cloth, first saturating the surface several times to dissolve the wax, then rubbing briskly with the cloth that has been well moistened with the turpentine also. In order to dissolve the wax more rapidly warm the turpentine on a steam radiator or in a hot water bath, but keep it away from an open flame. To ascertain if all the wax has been removed by re-dissolving it with the turpentine, go over a portion of the surface with a sharp scraper lightly and note whether any waxy substance adheres to the sharp edge of the tool and if so use pumice flour, saturated with turps, and rub the surface carefully, using a piece of rubbing felt, then wash off with turps or benzine.

—1916—

Preparing Roughstuff for the Country Shop.

For a two-day roughstuff mix say 6 lbs. Reno filler or slate flour and 2 lbs. white lead in oil with equal parts coach japan and coach rubbing varnish to a stiff paste and run through your hand mill till fine. Thin for use with pure turpentine only and avoid substitutes.

Another formula is to mix 5 lbs. French yellow ocher, dry, and 1½ lbs. white lead in oil. Mix this also with equal parts of coach japan and coach

rubbing varnish to a stiff paste, which run through your mill until fine. Then thin as above with pure turpentine, and should it not work smoothly add a few tablespoonsful of raw oil.

—1917—

Auto Top Dressing for Rubber Cloth Tops.

Melt 10 parts by weight of Cuban or Trinidad asphaltum, 10 parts by weight of refined coal tar, and 10 parts by weight of rosin, and 5 parts paraffine wax. When these are melted, add 40 parts by weight double boiled linseed oil, and 2 parts by weight of Chinese blue in fine powder. Heat this mass to a point when it gives off heavy vapors, then test samples of it. When such sample is cooled down somewhat and can then be drawn out in fine threads and does not show greasy rims when dropped hot on a piece of paper, the mass is cooled down as much as possible without becoming viscid, taking it away from fire and thinning it with 10 parts by weight of genuine spirits of turpentine and 10 parts by weight of coal-tar benzol.

RAILWAY EQUIPMENT PAINTING.

—1918—

Getting the Shop Ready for Winter.

To make the painting force as efficient as possible, it should be given comfortable quarters. Heat, ventilation and light are three vitally essential factors among many. Heat we must have, not alone for the benefit of the workman, but to insure the rapid drying of paint and varnish. Ventilation also is as necessary as heat if we would have the working force healthy, and the drying of paint and varnish sure and dependable. As to light, it has been said that efficiency is measured in direct ratio to the amount of natural and artificial light to be had in an available form.

The shop may not be equipped with a full complement of windows and skylights, etc., and it is, therefore, pertinent to consider in what manner it may be given additional light. For one thing, it seems to us that the interior of many shops might be made lighter through the painting of the side walls and ceiling a blank white; all scaffolding, girders, etc., to be painted white—making, in fact, the entire interior white and thereby increasing the volume of light coming to the shop.

It is quite wonderful the amount of light this manner of painting the interior brings to the shop. If a doubter, try the plan.

The average big railway paint shop is altogether too dark and dreary, and too much dependent upon the artificial lighting equipment. Artificial light is bad for the eyes, and for the most part a constant strain upon the vision; it produces weakness of the vision and tends to strain upon the system in various ways. For proof of this ask your oculist.

The plan, then, of painting the paint shop interior a blank white and, so far as may be possible, keeping it white, is one worth studying, along with other measures looking to the better lighting of the plant. Naturally, if we must be burdened with artificial light, it is best that this form of illumination be secured in sufficient volume and of a grade to be of substantial value to the workmen in promoting their efficiency and giving them a contentment not to be enjoyed otherwise.

It is along the line of the government administration of railroad affairs to produce the greatest amount of output per man possible and as a sure means of winning the war. Why not take this matter of light in all seriousness and aim to help win a point in efficiency? Then, too, take a look over the shop for any possible leaks of various sorts before cold weather sets in; make the shop warm and tidy as means at hand will allow. Get a certain hold on the ventilation; prepare for the winter before it arrives.

—1919—

Is the Elimination of Varnish Practicable?

Men in all seriousness are asking themselves this question; even the practical paint shop expert is in many cases taking a look around as if it were a matter of future accomplishment. For the outside of coaches enamels are now to a considerable extent being employed, and to all appearances these materials are becoming more popular right along. Some of the big roads are using the enamel system; not a few, it is said, doing away with varnish coats altogether, especially upon a certain class of cars, such as, for example, express and mail cars. Others still insist upon the use of at least one coat of varnish over the enamel as a better protection to the surface and especially upon surfaces having lettering applied to them.

This has been one objection, in many quarters, to the use of enamels, namely, that in lettering over them it becomes necessary to pencil varnish the sign work, or to apply one coat of varnish over the entire car exterior.

Again the point has been raised that the average enamel cannot be cleaned at terminals in the same way and to the extent that the regularly varnished surface is cleanable. With the application of varnish over the enamel finish the certainty of cleaning it becomes an established fact. Even on the inside of the car the varnish substitutes—that is, mediums containing a varnish base united with certain oils—are being quite extensively employed in some quarters with reported satisfaction.

So, take it all in all, varnish appears to be having a spell of diminished use, except upon the very best class of equipment. This is said to be an admission that varnish is still the indispensable and superior material; that as a protective medium it remains foremost. Varnish has the advantage of being cleanable under any and all conditions; it also confers upon the surface to which it is applied a distinction which no other medium is equal to—in a word, it is the Alpha and Omega of all painting and finishing processes.

And yet, despite this fact, its friends are able to note from day to day the restricted use imposed upon it. They are inclined to think that a fate may befall it equal to that which the wonderful one-hoss shay was forced to suffer in the ancient days. They are almost ready to confess that, with the advent of enamels, oil paint and similar concoctions, the ever ready and brilliant, and altogether fairly marvelous, varnish may be compelled to play second fiddle in the paint shop orchestra. However, have faith in varnish. It is indispensable, and it still leads the procession.

—1920—

Car Puttying and Glazing.

Car puttying and glazing processes on many roads constitute a large and laborious undertaking. Roads having any sharp curves, tunnels and winding roadways are most afflicted with the puttying and facing-up processes. Roads traversing mountain districts are particularly subject to equipment chipped and dented, and otherwise made in dire need of putty and puttying processes.

It has been well said that the least puttying, consistent with satisfactory appearance, produces the most reliable results, so with this remark ventured by a painter of experience to justify him in the matter, the car painter must choose the happy medium when the puttying process is under way. One thing should be understood at the outset of the work, namely, that whatever amount of puttying is to be done should be applied at the one time, so that when the surface gets under color it will not be necessary to putty again, for there is no place where this very essential pigment is so absolutely out of order as on top of the color coat.

Where the painting is done with several coats of roughstuff applied, the putty should be placed on the first coat of 'stuff. At any rate, this has been the practice with most master car painters, and it appears to be an entirely safe one. The central idea in this matter is to get the putty down below the line of least resistance, and where it may safely be held in place by a good body of pigment. Some painters observe the practice of puttying on the priming coat, which we are unable to commend. On the first filler coat, in our opinion, the puttying should be performed.

The priming coat, as a rule, has a trifle too much elasticity, and a tendency to let go of the putty prematurely, whereas the filler coat comes nearer to being of the same nature as the putty in its drying characteristics and assimilative properties. Not all men are gifted with the judgment and the foresight to know to what extent the surface actually needs stopping with the putty. Not a few men fear to apply enough putty, while others never fail, apparently, to put on too much. There is a happy medium between these two extremes, and it is this medium which the natural-born puttier seemingly knows at a glance. And those who are not thus born may well cultivate the habit of knowing, for this is, after all, the basis of the whole process.

—1921—

Good Putty Won't Shrink.

The one needful thing is to get the cavity filled, and, if anything, a trifle flush with the surrounding surface. Some one has said that this style of puttying is for the purpose of making allowance for the shrinking of the pigment. However, the properly-made putty, composed of the correct ingredients, will not, under ordinary conditions, swell or shrink, and most especially will it not shrink.

What is sometimes called shrinkage is simply the action of the pigment in shaping itself to a permanent position as it dries out after application. Some men claim that this change is more pronounced in a quick-drying putty than it is in a slow drying one. However that may be, the fact remains that if the putty is carefully applied and pressed compactly into the cavity it will stay in practically the same form and fullness of body during whatever change may ensue in the drying out process.

As said above, it is exceedingly important that the puttying be so carefully performed that the one application will suffice. The extra puttying at a later date, and when the color gets in place, is a real menace to the durability of the finish. The only safe and sure way of handling the putty is to get it well out of the way of any of the final surfacing coats and the color.

The glazing of rough, uneven surfaces, filling them up, etc., is another form of using putty that needs to have attention directed to it. Putty glazing methods are often used for the purpose of bringing up a surface quickly and at the outlay of the minimum number of coats. Hard-drying putty is made to a glazing consistency by letting it down with a little turpentine; such pigments have the advantage of drying very fast, which, in the case of putty or putty-glazing materials, is usually most desirable.

A fine and compactly-stopped surface may be secured by glazing or draw puttying, as the work is variously termed. The pigment should be applied as smooth as possible in order to save work in rubbing or sandpapering. On cheap work this method may be made to save, if need be, quite two full coats of rough-stuff without detriment to the finish. As a matter of fact, a lot of good surfacing can be done through putty and putty-glazing methods.

—1922—

Adhesive Properties of Pigments.

It pays the car and locomotive painter to have a good working knowledge of the sticking qualities of pigments, since this information is more than likely to stand him in good stead on numerous occasions. All colors, for example, ground in japan, are supposed to be more or less brittle and flaky, the blacks and deep greens and blues being particular offenders in this respect, but even here it is possible to inject something into the pigment to counteract the work of the japan.

Many painters, who are compelled to use japan ground colors in practically all their work, also make it a practice to use in the thinning of the colors at least one part of raw linseed oil to anywhere from three to five parts of turpentine, this depending somewhat upon the surface, its condition, location, degree of vibration, etc., along with the time allowance for drying, and so on. This practice is, we believe, a perfectly logical and reasonable one. Personally, we know of this practice affording results which through a long series of years have proven reliable and strictly worth while.

All lead colors, or pigments containing a good percentage of lead in their composition, are naturally adhesive materials, and usually afford a strong and virile base for the coats coming after. White lead is one of the best surfacing mediums known; it lays close together in its atoms; is dense, compact, and capable, under fair conditions, of retaining sufficient elasticity to give it a measure of life long after not a few pigments have disappeared through the

wear and tear incident to the passing of time. It is reasonable to assume, therefore, that all pigments having a certain per cent. of lead are stout of film and body, and adhesive to a fairly remarkable extent.

Numerous Western roads have long used colors closely related to lead in their composition, and all such pigments have invariably displayed a tough and tenacious wearing film and an adhesive body defiant in the face of disrupting elements. If it were possible to convert their color to something less conspicuous, with the ability to show dirt and dust less, they would be famously popular pigments. The main thing, after brilliancy of color and shade has been established, is to be assured of an adhesiveness that will forestall chipping and flaking. Adhesive quality, then, may be set down as the superior virtue in all pigments used in the painting of railway equipment. The color that will stick and hold fast in the face of overwhelming odds is the pigment most needed in car work today.

—1923—

The Good Surface Man in the Car Shop.

We hear plenty in favor of the most excellent varnisher, the artistic sign writer and striper, the superior car interior finisher, etc., but who ever hears sung the praises of the surface man—the magician of the sandpaper, rubbing stone and putty knife? And yet if it were not for the grubbing labor and the painstaking effort of these humble workers in the building up processes, the striping and lettering and the varnishing would go, in the matter of results, as the small cloud on the horizon. He lays the corner stone; other men build thereon. If his structure stays in place and wears on, well and good; if it fails, all else fails with it. Hence, we say, all honor to the man who laboriously fashions the outlines, it may be, of the finish that shall excite the admiration of the public.

Such outlines are the sum and substance of the finish, regardless of the fact that the average inmate of the paint shop is slow to grant the creator of them his due credit. In the apparently simple work of applying the priming coat there is much to make or break the mettle of the finish. This coat when worked on smooth, and yet plentiful as to material, with the maximum of oil and pigment worked into the surface, is in shape, other things being equal, to grip fast and wear tenaciously and hold in place the paint and varnish applied over it. So, too, in a like manner, the filler coat, the roughstuff coats, etc., which unite to make up a body of material for surfacing down and supporting the color and the varnish coats.

All these earlier coats of surfacing material invite a smooth and even application of pigment, with the material so applied as to furnish a compact and dense mixture. Then in the rubbing of the roughstuff there is an opportunity for making level and smooth that the good surfacer never fails to take advantage of.

He needs no guide coat to tell him when the right surface is reached; his mastery of the surfacing business tells him at a glance, or, at any rate, at a touch of the fingers, whether the correct reduction has been made. The guide coat is not infrequently called the mis-guide coat, and the high grade surfacer will have none of it. Sure enough, he is aware that the guide coat may be rubbed entirely away and the surface still be far short of being smooth and level, most especially the latter. By rubbing or pressing the finger hard down on the surface and drawing it firmly across the surface the result will show at a glance if the work is, or is not, rubbed sufficiently.

—1924—

Best Method of Rubbing.

Then there is the quality of the rubbing to be taken into consideration. To secure this, it is first necessary to have the stone working free and clean, and to have this state of things it is essential that plenty of water be used at all times, so that the surface is kept flushed clean of scourings and fine atoms or particles which the erosive action of the stone sets free.

This is one of the specific instructions of the master painter, to wit: use plenty of water and keep the surface well washed and watered. In this way we have a state of conditions which contribute directly to the clean and perfect working of the stone and a like condition of the surface.

The surface worker should be taught to work with straight out and return motions of the arm, thus avoiding circular motions of the stone. Teach the rubber to get the outer edge of the surface first; the center of the panel will always be caught most completely. It is the outer surface that gets neglected, if any, and by rubbing this part first you are sure to have a uniform condition of the surface.

Puttying is one of the jobs which most men shun. No more important branch of work is connected with the painting of passenger equipment cars. The puttying is half of the job, some one has said. It, of course, may lack being this, but one thing is certain, it is an indispensable class of work and must be taken care of at once, and, rightly, down below the line of color. The good man with the putty knife can enjoy the distinction of being a much sought for mechanic; one whose services are always in demand.

In a like degree, the puttier who is also a good putty glazier or stopping-up workman is also in constant demand. Not all men may become good and most efficient mechanics in the use of the elastic pigment. There is a natural faculty, or talent, if you please, which some men possess, and which other men try to learn unavailingly. Some men, to be sure, are first-class handlers of the putty knife, but are without judgment in the matter of what and what not to putty, and the result is that many important cavities and rough patches of surface are left to be taken care of at a later date.

To know what and what not to stop with putty is a long gain in the art of applying the supple pigment, and it is just this information which not a few men fail to acquire. The humble job of sandpapering is a class of work that calls for a man filled with enthusiasm for the out-of-sight tasks, but most fine finishing owes its start to the well sandpapered surface.

—1925—

Painting Substituted for Graining the Car Interior.

The imitation of mahogany finish for the coach interior for some years has been an exceedingly popular method, and the average steel car has been greatly improved in respect to its interior finish through the graining of the interior in imitation of mahogany.

There is a warmth and a cosiness about this finish that is most satisfying, to say the least. Beside it, the painted surface showing about any color one might name is cold and negative.

Recently, it is reported, there has been a manifest inclination to get away from the mahogany graining, and as a substitute for the grained surface, one painted in a mahogany shade, with as much warmth and life as possible introduced. It is claimed for this finish that, after properly protecting it with a good body of varnish, the color will wear practically as long as the graining, and under a superficial examination by the layman, at least, it will pass as looking quite as well.

As a matter of fact, a master painter has lately said that the surface well painted in imitation of the mahogany graining has an attractiveness by no means inferior to that of the grained surface, and while it, of course, lacks that grain effect of the wood, it is, nevertheless, an exceedingly pleasing substitute at an expense in labor of scarcely more than one-third of the grained finish. It is easy to see, therefore, why at the present time, of all times, the painted interior possessing in strong measure the agreeable home aspects of the grained surface is appealing to railway officials in a strong way.

Usually the surface is sandpapered thoroughly—speaking now of painting over the grained effect—and all cavities and blemishes made good and well stopped. Then a couple of coats of the mahogany shade of paint are applied and with two

good coats of some reliable inside varnish over this, the finish will make a brave showing. Supplement all these processes by rubbing the varnish at least carefully enough to lay down the luster completely and clear out all the surface atoms and dirt nibs, etc., and you have a finish for the interior that should render fine service and satisfy the great majority of people who can afford to travel.

It has been suggested that if we are to substitute the painted interior for the grained one, then why not in all reason make the economy more complete and omit the rubbing of the varnish, accepting the full gloss practice at its face value? In a very short time the wear and tear on the varnish will subdue the gloss and you have the dull finish without cost.

—1926—

Reasonable Road Service for the Finish.

How long should the finish wear previous to renewal? This question is one which would doubtless be variously answered, although we believe that a majority of master car painters would say for the passenger car at least revarnishing should occur not less frequently than once a year. This is not the average limit of service, however, and it would probably be nearer the exact figure to state from fourteen to seventeen months as the intervals between the shopping of the car. In respect to locomotives, we have no definite data, but it is a fair inference that the varnishing interval is quite as extended.

A master car painter, whose judgment the writer has every reason to respect, has said that the passenger car should be shopped for revarnishing not less than once a year; that while in the show it should receive at least three good coats of varnish, and that other processes should be applied as a means of making the car ship shape over all and in order that no false notes in the finish might be struck. This period of wear for the average car might be called unreasonable road service, as it is. To allow the equipment to remain on the road for a much longer period is to invite an over exhaustion of the finish and to make the latter end of it replete with disappointment.

To get the best wear out of a finish is to feed it from time to time with a vital element that will not alone be of use to the outer film of varnish, but will strengthen and add life and vigor to the structure beneath the varnish, and which is really an important part of the finish. When the shopping is deferred and the old finish is made to bear up under the burden of increasing wear and drain upon its resources, we have a condition presently which is exceedingly difficult to correct and restore to its original form. The shopping period may be prolonged, manifestly, through a systematic course of terminal cleaning, but at the present time we are in grave doubt concerning this class of cleaning being largely adhered to. If the cleaning practice can be carefully followed out, and made a systematic practice, with an oil emulsion cleaner being used, and the varnish fed and nourished amply, the shopping period may be prolonged amazingly. These are war times, and the railroads are being taxed as never before, and the cleaning must be performed as help can be furnished, which makes it more spasmodic than systematic. Hence the need of more frequent shopping for painting repairs.

—1927—

Main Factors in Surfacing Building.

Formerly, if one were to ask an old-time vehicle painter, which, of course, includes the car painter, the main factor in surface building he would at once be informed "the priming coat." About every youth who served an apprenticeship in the paint shop was taught to respect the value of the priming coat and to set great store by it. He was taught that with the primer right all other things would be added. So, in time, it came to be understood that about all the other processes and activities swung in their orbit around the priming coat.

Today this same reverence for the first coat that goes upon the vehicle—assuming that it is a new one—is displayed, and when a job is in question relative to its quality, etc., the first query is concerning the character, dependability and general usefulness of the priming coat. Apparently, it all depends upon this coat; if the primer is right, other things being equal, it is well and the outcome need no longer be in doubt.

However, while the primer is a main factor it is not *the* main factor. The coat coming immediately after the primer—call it what you may—is equally responsible for the results to be developed. The first surfacing coat after the priming coat, called the filler coat, has an important work to do, and with this first coat it must act as shock absorber for all the later coatings.

Following these two coats come other coats in the plan of surface building, all of which must be of the best possible composition and make. Four facts should be taken into account in connection with these surface building coats, namely, smoothness of application, depth of film, fineness of grinding, and their capacity to lay close together and yield a smooth and close textured finish.

—1928—

Relation of Varnish to Finish.

The relation of varnish to the finish is vastly more than a simple beautifier of the colors applied; more, even, than a protection of them. It is alike a protective medium for the colors and an enhancing of their fine looks, and, in addition to these offices, it performs an important function in giving length of days to the vehicle to which it is applied. Varnish is not an easily understandable material; even the chemist has a hard job in picking it to pieces—an impossible job, it is frankly stated by many of the famous ones.

Proportions of ingredients entering into varnish may not be determined by the men of science. They get into the solution a little way, it is true, but anything definite regarding varnish other than a simple statement of the things composing it is as fleeting as the barn swallow in the twilight. But practically the value and real worth of varnish may be told in the language of the varnisher after a few trials of the material.

The durability of the material must, of course, be determined by means of a test out in the elements and through the hard days of service. But all these things are brought out through the observation, working, and use of varnish by the painter as he toils for his substitute bread and to win the war. There is one thing, at least, which the painter may confer upon varnish through using it, and that is a better power to resist wear and tear, and to shine more brilliantly and give a wider measure of protection. How may he do this? Simply through the application of heavier and more uniform coats; through making the surfaces cleaner and more adaptable, and by maintaining a warmer room condition and a more uniform one.

These may be esteemed merely rules of practice and not of sufficient force to influence greatly the character of varnish, or its working out, brilliancy or durability. Nevertheless, they do influence to a very marked extent the life and luster of varnish, and they deserve important consideration. In the application of varnish, for instance, the brilliancy and the protective value of it as a surface-coating depends chiefly upon the amount which the varnisher is able to get on the surface and make remain there in shape to furnish the maximum effects and results.

A fine, deep, rich body of varnish is always a trade-mark of the expert and finished workman. It means, moreover, a degree of wear and a depth of luster and an amount of protection which the mechanically and laboriously brushed on coat of material can in no wise approach. The finisher able to get the results here commended cares precious little about the contents and composition of varnish; it may not have just so much of this and just another amount of something else as a means of conforming to certain chemical formula, but the fact that it is good, dependable varnish capable of making a great show of brilliancy and wearing like a hob-nailed shoe is the all-sufficient badge of value.

The wear of varnish depends far more than some craftsmen are willing to admit upon the cleaning of the surface preparatory to varnishing. The cleaner the coat of varnish, other things being equal, the longer it will wear and the deeper the luster, and, naturally, the better it will appear. Dirt in varnish will always blur the luster to a certain extent; the cleaner the coat of varnish the deeper the brilliancy; for, as you think of it, you will admit that there is more real varnish to wear and shine. There is neither luster nor wear in dirt particles, even though they may swim in varnish. And a dirty field of varnish is not pleasant to look at. For which reasons it is essential that the surface be cleaned as nearly perfect as may be and kept clean.

Also the surroundings should be cleaned and kept clean, or as near clean as possible. This is not so easy, certainly, in the big railway paint shops of today, but we believe that it is possible to better some of these conditions by the enforcement of certain rules covering the disposition of dust and dirt, and the making of dirt, etc. If all finishing varnish used in car work were to be strained carefully, as such varnish is strained in carriage and automobile paint shops, it is certain that an improvement in the cleanliness of the finished work would be noted at once. And we believe that it would be found worth while.

There is a great difference in the quantity of varnish applied by different varnishers; some men just naturally flow on a great volume of varnish and get it to stay up and shine out like a full moon, where it will wear on and on, while others fairly scrub the coat on in a manner to make it lack uniformity in depth of body, luster, and in those other things which count immensely in the finish.

—1929—

Harmonizing Effects.

Nothing adds more to the well balanced finish than to have all the details carefully attended to and made to show a uniform effect. This, naturally, is not easy to obtain when there are so many details, big and little, to attend to. Take the inside of the car, for an illustration:—Here we find a lot of small items of work which, if allowed to go without some close attention, will inevitably throw the finish quite out of balance. It may be the matter of the small metal fixtures, or the window sills, or the seat arms, or the deck sash, or the toilet room floor, or some other little affair, which, if not given a brightening up with the proper material, makes the whole interior appear out of harmony.

The traveler seeing this—and the average traveler is nothing if not observing, perhaps just as a means of “killing time”—immediately connects it up with the finish that is out of balance, and he begins to wonder why some one failed to take notice of the discrepancy and burnish up the defect. The same thing may occur on the outside of the car; and if so, it is bound sooner or later to be noticed and commented on.

The finest sort of finish may have been applied to the car, both outside and inside; the color effects may be fairly perfect, as such effects go nowadays; lettering is all correct, and, in fact, about everything seems to be touched off with the hand of a master, and yet, as the inspector goes over the car, there is to be found not a few major and minor defects bound to attract attention sooner or later and invite criticism.

We have been told that good general effects are the main consideration; that the little blemishes and things forgotten do not avail, but alas! we have learned in the stern school of bitter experience that such is not always the case. The impression is lasting that these little things, so-called, do materially affect the status of the finish; that the ill-balanced painted and finished car is certain to attract notice most unfavorably.

Admittedly, this off-balance may be but a trifle in the sum of the excellent features, but, nevertheless, it is there, and it must in some cases be explained. Hence, we say, let this matter of harmonizing have a little more attention at the hands of the foreman, or his assistant, or the inspector, to the end that effects both inside and outside may be one in balance and harmony, and in all those essential features which combine to make up and round out the well painted and finished equipment.

—1930—

Efficiency Through Heat.

Paint shop efficiency, after making allowance for the skill of the painters, is due during the cold months of the year in large part to the amount and character of the heat supplied. No matter how efficient the paint shop organization is under normal conditions its capacity in this direction avails little if the shop is lacking in any degree in the proper volume of warmth.

Efficiency is established in another direction, also. The rapid drying of paint and varnish must come in the main through the heat of the shop. In the absence of this vitally necessary element the materials used by the painter dry slowly or not at all, with the result that practically everything about the work of painting and finishing is retarded—slowed up. When the men are compelled to stand around and heat their hands and dance a jig to keep the blood in circulation there is certain to be very little efficiency hustling around in search of an owner.

The inhospitable paint shop is really a most discouraging affair—and a most unprofitable one. The warm shop is almost invariably a hospitable shop, and other things being equal, it is an efficient one. It is true, at least in a great number of cases, that the railway paint shop is inadequately heated. And, for the most part, this is the direct result of a wrong arrangement of the heating apparatus, or a lack of power from the heating plant.

Not a few shops erected ten, or fifteen or twenty years ago, have the heating pipes adjusted overhead, with openings through pipes extending down into the shop space at greater or less distance, and a majority of such equipped shops are furnished with an inadequately supply of heat, or rather the heat is not furnished where it will do a great amount of good.

Heat ascends and when the heating arrangement is located at the topmost point of the shop, or very near the ceiling, the chance of the warmth getting down where it may help the workmen and promote the drying of the paint and varnish is exceedingly remote. The correct position for the heating pipes in the paint shop—in all shops, for that matter—is at a point under the floor, or at most, not above the floor line.

Then, if an adequate volume of heat is supplied, the shop is sure to get the full benefit of it from floor to ceiling. This type of heating plant is, so far as we are able to discern, the only complete and successful one. It is qualified to furnish the heat at a point and in a form that will insure the maximum quantity and the most prolific results.

—1931—

Good Looks and Durability for Passenger Car.

Perhaps the master car painter will say, as we believe he has a right to say, that the best manner of accomplishing the result is to get the car to the paint shop at least once a year for revarnishing, and if necessary, repainting. At any rate, it is consensus of expert opinion that the car should be varnished every twelve months; of course, if there could be an established terminal cleaning system so that the surface might have the benefit of a good cleaning medium and preserving material combined, the car might, under fair traffic conditions, etc., run along nicely with a good protection of varnish, and without detriment to its general condition, for sixteen or eighteen months.

But in the main it will be granted that terminal cleaning is not being carried on to the extent that it should be; that there is not on a majority of roads a systematic cleaning practice enforced. Cars are cleaned, not at stated intervals, but rather as the spirit moves the cleaning department, in far too many instances.

During the last year or so this practice can be justified by the exigencies of the occasion, but under ordinary circumstances it cannot. It may be urged that this frequent cleaning of the equipment is conducive to the wear and erosive effects upon the varnish, and that will account for the need of sending the car

to the shop not less than once a year for varnishing operations, etc., but when the cleaner is so builded that it contains both a cleaning and a feeding and preserving medium this matter of erosive effect will not enter into the problem to any significant extent; leastwise not during a year or a year and a half.

It was said fifteen or twenty years ago that the car could easily be over-varnished; that it was advisable to limit the number of coats and thereby get a better class of service. With the coming of the steel car, however, this danger of over-varnishing—if it were ever really a danger—has gone the way of a lot of other disputed theories, for the steel car, bear in mind, has a wonderful and a fairly mysterious capacity for absorbing and taking up varnish and holding it in such a position that the elements just naturally shave the film in a series of parings that appear to reduce as if by magic the originally rounded and robust body of varnish.

Perhaps it is not consistent with the special features of the case to set forth any certain and undeviating interval to elapse between shoppings of the steel car, but in any event it will bear frequent shopping for varnish.

—1932—

Quality in Color for the Car and Locomotive.

By this term we refer to the fineness of the pigment, to its luster, its spreading quality, its capacity for holding color and tone under the harsh conditions of service, and for its general durability. A first-rate body color for the car is something to be prized; likewise a good black for the locomotive.

Fineness in a color makes for a good appearance, although it is not all the elements which the pigment must have to insure its popularity; there is the luster of the color, its brilliancy, its capacity to withstand the discoloring properties of varnish; also, its strength for resisting the sunlight, etc.

Many colors—notably the Pullman car body color—take on a number of different shades if varnished over before they are perfectly dry, and because of this property great care must be observed in this respect. This premature coating with varnish is also likely to change the tone of the color as a whole. Then, too, most colors are greatly affected by the varnish used over them. This might be obviated through the use of varnish-color, but as a rule varnish-color is not largely used on the outside of the car today.

Blacks for the locomotive vary greatly in quality unless the purchaser holds rigidly to being supplied with a color of acknowledged superiority in all the points which establish quality. The very best black, because of the color, is the most transparent, and for this reason is not infrequently looked upon with suspicion. Nevertheless, the black endowed with an extreme supply of brilliancy and color tone, is almost, if not entirely, without exception, a weak covering material, requiring either two coats of color or one coat of color and one coat of varnish-color, before receiving the varnish.

In the Tuscan reds there is great variation in the tone of the color, in fineness, and general quality, etc. But the user would better accept the superior quality, regardless of the price, as being the cheapest ultimately.

So, too, might we speak of the other colors which the car and locomotive painter is called upon to use in his business. All these are entitled to the most careful scrutiny and selection. Good colors represent, after all, a very important part of the painting of the car or locomotive. The power possessed by a color to stand up under successful colors of varnish—to retain its unimpaired texture, its good looks—without showing a weak spot or place, is another manifestation of color value which the user cannot fail to take into consideration.

—1933—

Surfacing Processes and Their Relation to the Finish.

As a matter of common knowledge—common technical knowledge, perhaps, it was more correct to say—these surfacing processes are a part of the finish;

indeed, the very warp and woof of it, and you can no more dispense with them than you can omit the varnish coats. Much of this surface is today being carried along without the use of roughstuff, and where the narrow sheathing system of coach construction is adhered to, as in the case of the Pullman sleepers, for example, this dispensing with the regulation roughstuff coats is conducted with a great deal of success.

Such narrow panels take very kindly to the putty facing practice, and when this is performed with skill and care the finish built upon the foundation is quite neat enough to satisfy the most exacting. One of the methods of handling this class of work is to use a French scraping knife with a blade wide enough to fully cover the width of the panel. Then either brush the putty glaze on or make the putty a little heavier in consistency than the ordinary putty and draw the knife from the top of the panel directly down through the length of it, thus securing an even application of the pigment and making it of a thickness of film sufficient to furnish the necessary body for sandpapering, etc. In this manner a good substantial body of material may be fixed in place upon which to carve out a finish of the right sort.

Where the panels are of the type found upon the ordinary steel coach, or upon the locomotive tank, the business of getting a sufficient body of pigment in place upon which to rub or sandpaper to the required levelness and smoothness, without resorting to the use of roughstuff, is entirely another matter. In some shops the practice has been in vogue of putting on a coat of roughstuff over these big steel surfaces and then draw puttying the entire surface between the rivet heads.

This method particularly obtains in the case of an old surface somewhat checked and fissured, which it is desired to fetch to a finish without the removal of the old paint. In all these cases, so far as we are able to see, it is not easy to dispense with the use of the roughstuff; that is, if a first class finish would be had.

It goes without saying that the ordinary methods of surfacing with putty alone are wholly inadequate; the finish over such surfacing processes looks underfed and ill-nourished, and lacks a certain fullness of body and a levelness of detail work, that at a glance stamps it as a second rater as compared to the finish worked out over a roughstuff body.

—1934—

Painting Freight Cars.

Some twenty odd years ago Charles E. Copp wrote in a railroad publication current at that time as follows:—"Painting freight cars is not as nice work as some other kinds, but it brings the painter just as clean work, and oftentimes more health, as he is more out of doors in the pure air." Then after asking, "What is the best paint for freight cars, economically considered?" he replies in these words:—"A good oxide of iron, not too finely ground, mixed with a suitable oil."

The substance of Mr. Copp's additional remarks on this interesting subject is to the effect that such a paint is excellent by reason of the fact if applied to the bare wood and not painted too often, but as often as its condition requires, the man never lived who ever saw it blister or peel. One reason advanced by Mr. Copp—and the reason, by the way, is quite as pertinent today as when it was penned—that a good oxide of iron paint that is mixed with a good oil, and applied over the unseasoned wood that so often and to such a large extent goes into the construction of the humble freighter, has sufficient porosity to permit the moisture contained in the wood to escape. In other words, the oxide of iron paint does not hermetically seal the pores of the wood, thus allowing the moisture to both enter and leave as nature makes such action necessary.

Paints of a varnish-like nature, or containing an ingredient that causes the pores to choke up and refuse exit or entrance to the moisture working from the bottom outward or from the top inward, are likely—are practically certain, as a matter of fact—to puff into blisters from the moisture beneath the paint. All

such paints, moreover, as they grow old, and more or less decrepit, invite the invasion of moisture from the outside and this same moisture once settled under the paint somehow appears to have difficulty in escaping quick enough when heat or a drying agent of some sort compels it to move, and when this action begins in earnest there is sure to be an eruption of surface conditions in the form of blisters, or peeling, etc.

The freight car paint of desired durability must have a breathing apparatus in fine working condition at all times to let the moisture pass while at the same time protecting the car from overmuch deterioration. Not only the above, but from the standpoint of cost the oxide iron paint, as compared to many other makes of a more pretentious name, is cheaper. Then in the matter of appearance, the neat brown exterior is pleasant to look at. It also yields an effective background for the stencilling.

—1935—

Light and Sanitation Agents of Efficiency.

And why not? Light is the great and indispensable medium of mankind. It is the servant of the just and unjust. Without it the car and locomotive painter would be plodding aimlessly about. A recent visitor to a big passenger car paint shop remarked to his host that the average car paint shop, whatever other advantages it may enjoy, is sadly handicapped in the matter of light, and especially uniformly distributed light.

No more efficient agency may be commanded than this free and noble gift of the Almighty, and yet we fail to take advantage, as a rule, of its resources for creating efficiency and for making the lot of the workman easier and his contentment more secure.

Supplementing the natural light here referred to is needed a volume of artificial light furnished in a uniform supply at all points of the shop, to the end that the workman may be given the opportunity to labor at the maximum speed at the minimum outlay of effort. In this way he is able to prove efficient, other things being equal, for the full period of the working day.

He is also able to perform a better class of work. This matter of light, you may doubtless remark, is within the province of the erecting engineer—a point well taken, possibly, but one nevertheless open to analysis. The influence of the master painter does not go wholly for naught; it may be the still, small voice heard in the wilderness, but if persisted in with the terms of the diplomat it is certain to be heard by some reasonable man, or body of men, having the proper authority, and out of the wilderness is due to come improvement and better natural light facilities and resources.

In close relationship to light must be reckoned sanitary conditions making for better health and improved conditions generally. Every paint shop should have a sewerage system working so efficiently that a good and wholesome atmosphere is at all times the result. Diseases without number are the direct outcome of the contaminating effect of a defective sewer system. Nothing quite so nearly approximates real safety first in the paint shop, with all the noxious and poisonous exhalations and the destructive bacteria floating about the premises, as a carefully provided and maintained system of sewers, supplemented by a practice of cleaning and caretaking calculated to make them workable under all circumstances. These are active agents of efficiency and are bound to prove a strong contributing force to a more productive shop.

—1936—

Store-Keeping Operations.

A shrewd master car painter once remarked that a skilled and careful stockkeeper "is a rare jewel," which, translated into perhaps commoner phrase, means that this necessary individual is a main prop of the shop. When you come to pry into the affairs of the stockroom connected with all railway paint shops

of any considerable size, it is plain to be seen that the experienced stockkeeper—and we mean this to be an all-inclusive definition—is really the man behind the organization who, next to the master painter, makes it stand up and do things in a rapid and big way or permits it to go to the shambles through waste and extravagance.

It is not to be overlooked, of course, that the stockkeeper may, through an over-exactness and too much assumption, produce an intolerable situation, productive of results precisely the reverse of what is rightly to be expected, but as this is getting away from what is included in the term “expert stockkeeper” we shall not here attempt to discuss this phase of the problem.

The master painter is in a position quickly to discern any of the conditions referred to. Failing to correct them, the blame rests upon him alone.

Just at this time we desire more particularly to have reference to making the stockkeeping department more efficient, if possible, than it has even heretofore proved. Is it not fair to assume that there may be opportunities for still greater savings in the matter of mixing and handling materials? Perhaps if closer attention to the cleaning out of containers, metal or wood, were given it would, in these days of record-breaking costs, be the means of making an important saving.

Then, too, in the handling and preservation of the primers and fillers it may be found that there is a waste to be corrected. These materials are by nature, when mixed, mussy and sticky; they also, through evaporation, lose an important element that directly conduces to this state. This evaporative action may be checked by keeping the containers air tight, but, despite the best attention in this respect, some of this condition is due to develop unless the close attention of the man in charge is directed to it.

Then we have the mixing of special paints and colors coming along all the time. Here, again, is the big chance for waste unless the genius and skill of the stockkeeper comes into action. In varnishes, driers, thinners—in fact, in all the major or minor matters having to do with stockkeeping affairs—it is the man in charge who must stop the leaks and squeeze every available ounce of efficiency out of his department.

—1937—

Finishing Processes for Trucks and Platforms.

Numerous methods of painting and finishing trucks and platforms are in vogue at the present time, and the thought occurs, if standardization is contemplated in the manufacture of cars and locomotives, why not give attention to some standard method of painting the humble trucks and platforms? At the present time one road gives thorough surfacing and painting and finishing processes to these parts of the car, while another road may literally give them “a kick and a cuff,” while still another road passes them up with a coat of oil paint brushed on or smeared with the spray machine, so that, taken as a whole, there is no systematic practice in connection with the painting of the truck and platform car feature.

These parts of the car, it will readily be allowed, furnish the master painter no small amount of concern, both in the cleaning and the painting. Caustic soda, sal soda, lye and various alkalies specially prepared and marketed under appealing titles are used in the cleaning and scrubbing of trucks and platforms, and even these powerful agents are sometimes taxed to their utmost in the work of removing the adhesive road accumulations.

—1938—

Thorough Cleaning Essential.

There is small reward, however, in attempting to paint over such parts in a partially cleaned state. Indeed, it is a sheer waste of valuable material. The work of cleaning must go on until the surface is cleaned, and it is here that the master painter finds his annoyance.

The truck washer who knows his job and, without giving his superior worry about the matter, is able to go ahead and get these parts clean and fit for the painter is worth holding in good favor. Then, in preparation for the enamel or whatever finishing material above the oil paint order is elected to be used, the trucks are at least worth a sandpapering process that shall knock down the surface nubbins and smooth up some of the roughness that comes through service and scrubbing affairs. Platforms, of course, to receive the same attention.

All this work, it seems to the writer, is worth while, provided it is the practice to enamel or varnish finish such parts, instead of applying just a rough coat of oil paint. To apply an expensive material to a surface in a rough, knotty condition does not pay any real value in service or in appearance. If appearances are to count as a factor in the painting of trucks and platforms, along with protective results, then the motion is made to fit the surface to merit the material.

—1939—

Painting and Finishing Coach Headlinings.

The evident tendency in coach headlining painting is favorable to the light-colored lining. The color just off a white, with a greenish cast to it, along with the ivory white, appear to have the call in large part today. There is a cheerfulness about the headlining of the lighter shades which goes far towards giving the entire coach interior a more cheerful and homelike effect. The traveler is not indifferent to this effect—call it psychological if you will—and he remembers it long after the journey has been concluded, and makes comment upon it.

Apart from whatever mental processes it may arouse in the mind of the traveler, this effect produced through a coach headlining is worth noting as good advertising. It makes people remember when they traveled up on So and So's road, and the enjoyable time spent in the coach with the soft green tinted or ivory white lining. How they remember the home comfort feeling experienced! It is talked about and commented upon most favorably, and altogether the painting of the headlining in these fair and lighter colors passes on as a matter of advertising that invites a wider treatment of colors for this part of the car.

—1940—

Car Body Color.

Car body colors are comparatively few in number, and this limitation in the range of pigments used is an advantage just at this time, at least. With Uncle Sam in control of all railroads, and passenger cars being used indiscriminately first upon one road and then upon another, it is very convenient to have the range of colors confined to the fewest possible pigments.

Probably the most used color, and, all things considered, the best liked, is the Pullman car body color. However, it is not always easy to get the exact Pullman shade of this color. Various grinders turn out various shades of this most likeable pigment. Some run to a deep greenish shade and others to lighter tones, and still others have the reddish shade, and others still the yellowish tinge, so that taken all together, you are as a rule quite at sea as to just what the Pullman standard is.

We believe the Pullman standard car body color, as clearly recognized by the Pullman people, is a color of that name with a faint olive blend to it. Reddish or yellowish tones, when decidedly manifest, are objectionable, as are also those cold green effects which remind one of a cold storage plant. Pullman color has the peculiar property of going badly off shade when varnished over previous to having become perfectly dry. In fact, we have seen as many as half a dozen shades of the same color when the surface has been varnished over a little too soon. Not only this, but the color will also show two or three shades if cross-brushed to any extent at the end of panels.

In putting on the color it is correct practice to carry the brush strokes quite out to the end of the panels, thus leaving no excuse for brushing across the field color at the end. Nor should the color be varnished over until it is thoroughly dry through; this will avoid trouble and insure for the work better color results. The real quality of a Pullman color is found in its uniformity of tone and shade and density or opacity. With these all established, and the color given plenty of time for drying out prior to varnishing over it, the Pullman color will be found most satisfactory. One thing in favor of the Pullman color is that it is a color that wears well if kept properly protected with varnish; it shows dust and the stains of travel at the minimum, and it cleans up nicely. If kept well confined under varnish it is certain to meet about every demand made upon it.

—1941—

Cutting in the Car Exterior with Color.

This practice, developed within a comparatively recent period, has grown to large proportions, as it has deserved to. The employment of gold leaf in lettering passenger car equipment has undoubtedly popularized the cutting-in process, for by the use of the gold letters and numerals this work may be carried along for several years intact and looking quite as good, for the most part, as the first year of its application. In order to get the full benefit of the gold leaf it became necessary to cut around the letters and figures with color and fill in the field space. This practice was found to be both economical and durable.

With the color carrying enough binder to glue it fast to the surface it gave a fine looking and a splendid lasting job when protected by two or three coats of varnish. And the gold shines on and saves the company money. Headlinings are being cut in on the same principle, i. e., saving the striping and decorative effects.

It has been discovered since the cutting-in practice has been in vogue that many surfaces now are treated in this way which formerly, it was supposed, must be worked up very thoroughly and then given two coats of color and as many coats of varnish. This method, however, failed to furnish, on the whole, anything more durable than the cut-in job is proving to be. Nor in the matter of appearance did the two coats of color and the varnish coats furnish anything in advance of the present process of cutting in, so that from whatever angle you choose to study the matter it is found that the cutting-in process has certain important advantages which cannot be laughed out of court.

It is understood, of course, that when the surface is found in a shattered and fissured condition, with other prospects not pleasing, it is to the point to proceed differently, and to take up a more complete surface reconstruction; but with the surface in a fairly good condition, with the checks, if any, running shallow and subject to the assimilative virtues of the color and the varnish, the cut-in process offers an opportunity for getting out work at a rapid pace and in a condition to disarm criticism.

Now that striping of the car exterior has largely disappeared, the cutting-in method has been greatly simplified, and the cost proportionately decreased. But its advantages remain none the less clear and worth while. It is good business and good craftsmanship to cut-in the car exterior as often as it can be done without discrediting a first-class standard of work.

—1942—

Shop Floors, Sewer Systems and Sanitation.

The cement, granolith, or other hard composition floor, is one of the needs of the modern shop. This floor should be accompanied by a sewer system capable of carrying the silt and small refuse matter in addition to the water used in the regular course of shop work. The floor is an important adjunct of the paint shop, and no small proportion of the efficiency of the working force is due to the

character and maintained condition of the floor. The drainage of the floor adds to or detracts from the efficiency referred to. When the men, at every shower, are compelled to retreat to the car platforms, or to some other higher point, to avoid wet feet, or a partial immersion of the body, there is sure to result a loss of time and labor. The space between the rails should have a crown finish with the highest point at the center of the space. Under this formation, the water used in car washing, and for other purposes, will be immediately drained off, and the working force will have the advantage of a comparatively dry standing room. The lowest point of the floor, under this design, will be under the center of the car, and if the sewers have been located properly, with the incline of the floor leading directly to them, the quick and thorough drainage of the entire shop floor, following the washing or other car cleaning or rubbing processes, will be a very natural result. All this will help also to insure the correct sanitary conditions. The erecting engineers, quite after the manner of the master car and locomotive painters, are not precisely agreed as to the best and most durable composition of the shop floor, but they are unanimous as to the necessity of keeping the floor clean and sanitary. However, lacking the proper drainage this is not an easy matter, even when plenty of help is available. The floor composition, for one thing, should at least have a hard surface finish without being slippery; it should, moreover, have a cleanable quality—that is, it should let go of the accumulations readily and slick up at the minimum outlay of labor—and it should be durable. The shop sanitation, vital to the health of the working force, had best be given a large place in the plan of making the shop efficient. With the floor made of the right material and design, and the sewer system built to take care of all water and drainage work, a long stride toward improved shop sanitation has been taken. The proper ventilation is the third great factor in this scheme for a healthy paint shop working force.

—1943—

Railway Paint Shop Problems.

Many gentlemen of leisure, who recline luxuriously in the nicely finished steel coach while seeking pleasure abroad, now and then have the misfortune to wipe up an atom of undried paint, and immediately the \$15 suit of clothes becomes valuable to the amount of \$35, or perhaps \$40, and the painter is forthwith invited to explain the reason why the paint should be in a condition, after release from the shop, to besmear the traveling public so profusely. The fact of the matter is that a single fat edge on some coat hook, window catch or lift, or about the seat frame or the striker arms, etc., may chance to get wiped up by some lounging passenger, and the tiny smear at once develops into a ruined suit, and not infrequently into a legal suit. The average master car painter has, for years, made an effort to prevent this very sort of trouble, and we believe that only occasional cases are now encountered; nevertheless, they are sufficiently numerous to lug a lot of excitement into the painter's daily grind. On more than one road this class of accident has resulted in the invention and use of a so-called invisible paint; that is, a paint lacking a positive color, which against any of the dark fabrics is practically neutralized by the color effects of the goods. The car with the reddish interior, with trimmings to match, offers the best color to transfer to the \$40 suit of clothes, with a logical claim filed for this or an increased amount. It is safe practice, of course, to get the baskets and the small fixtures, which are to go in a paint finish, done up well in advance of the release of the car. When this is done, and the parts in question are wiped over on their under surface, to catch away any possible wet atoms, before the car goes into service, and the paint used is of a neutral color, this entire problem, it seems to us, should be about solved once and for all. A friend of the writer's suggests the feasibility of spraying the underside of the steel car floor, and thus doing away with the dirty and smeary job of hand painting these parts. If the car could be placed in a position where this work might be performed without proving bothersome to the workmen employed in the vicinity—better, in a place

specially provided for it—this spray method would be, considered broadly, not only the most economical, but it would insure having the surface more perfectly covered, and the job would at once lose most of its objectionable features.

—1944—

Vibration Checks.

Vibration checks or fissures are the result of excessive surface strains, oscillation, and pressure at diverse angles, and while the master car painter has not be troubled from this source to the extent experienced by the carriage and automobile painter, he is nevertheless forced to face it at most inconvenient times and when explanations seem inadequate. To the layman, this form of surface disturbance may seem far fetched, largely because of its technical character, but to the painter who meets an example of vibration cracks there is something mighty embarrassing in the situation. This form of trouble, on the steel coach, is hard to control, for with all the mending and fixing of the fissured patches, the car once in service goes right on doing the same old contortions over and over, so the rent made whole today may yawn wide open tomorrow. The naturally suggested remedy for this trouble is the use of more elastic coatings. These are qualified to respond to the strain put upon them—giving and taking, as it were—and thus preventing the break in the film. Unfortunately, however, this elastic fabric in these days of quick processes of painting is not so easy to develop as in former times. The best the master painter can hope to do is to build up a foundation as supple as time and the properties of the material will permit, and then trust to a kindly fortune to do the rest. If the undersurface has been carefully brought along, using care in the distribution of the elastic element, with the coats given proper time to cure out and dry correctly, the main thing left consists in using an outside finishing varnish of a reasonably elastic nature, and putting enough of it in place on the surface—say, three coats—to jointly overcome the strain effect imposed. The question has been raised that perhaps too frequent varnishing of the car, with the result of creating a deep body of gum and other constituents, is the cause of many of the vibration checks. This is hardly a plausible reason, since the steel car, as a rule, is not varnished frequently enough to allow an excessive accumulation of these mediums. Indeed, most steel cars, even when varnished twice a year, show a very thin vestige of varnish, the erosive effects combined with other foreign matter appearing to have unusual power for reduction of the varnish body. With the primary foundation made right and tenacious, the ample body of varnish, supple and fine, renewed at the opportune time, vibration checks need not give unusual trouble.

—1945—

The Cracking of Varnish.

The cracking of varnish is certain to put in an appearance. The great attainment is to postpone the visit to the maximum limit. And it is quite wonderful how the master car painter is able to prevent this cracking and fissuring trouble. It must be allowed, at the beginning, that the quality of the varnish exerts a powerful influence upon the disposition of the material to check before its natural time; hence, the quality must be above suspicion as one of the first steps towards adequate prevention. Next in order must come a system of painting and varnishing calculated to withstand, for the longest possible limit, the strain and exacting service put upon it. What shall this system be, in the main? Simply a few fundamental rules of practice, granting the quality of the material, from start to finish, to be of a superior grade. First, clean and careful application of all the coats of material. Second, a very thorough drying of these various coats. Third, a somewhat cautious exposure of the finished car to the direct sunlight, following its release from the shop. With these matters attended to fully, the master painter may correctly enough "put it up" to the varnish to

hold its place and form. That good varnish does this, to a most satisfactory extent, must be admitted; that it is doing it today better than ever before must also be admitted. Even the best varnish, like the best constitution, sometimes breaks down under a sudden or unusual strain or burden put upon it, so the fact that now and then, at least, the varnish tried and true suffers a collapse need not greatly disturb anyone. It is merely exhibiting its very human side and probably not responding to any organic weakness. Run the freshly applied varnish from a cool atmosphere to a hot, sun stricken one, or vice versa, and the strain of contraction and expansion must be violent at the most moderate estimate. Think it over, and marvel not that varnish occasionally fails to stand the strain.

—1946—

Elasticity Essential in Steel Car Painting.

Readers of this department will recall the fact that two or three years ago the Pennsylvania Railroad, at its Altoona plant, installed a baking oven for the purpose of demonstrating, among other things, the feasibility of finishing passenger equipment cars through the medium of the baking oven. One of the facts brought out, during the accumulation of data upon the subject, shows that the linear expansion of steel is more than twice that of wood. This indicates that considerably more elasticity is needed for the paint and varnish fabric protecting the steel surface than has formerly been granted. It is admitted that, in the priming of the new steel surface, less oil is needed than is used, as a rule, for the wood surface, the capacity of the steel for taking up the elastic coating being limited. The percentage of oil used for the priming coat, taking steel surfaces as they run, should not exceed one part oil to two parts turpentine. Not a few master car painters prefer to use one part oil to three parts turpentine. Following this coat must come a material made up of a proportionately diminished quantity of oil. Having the foundation directly over the steel fastened to the latter through the agency of a portion of oil well taken care of by the metal, with the entire film of surfacing material dried through, the painter may very properly give heed to the power for expansion of the metal when exposed to varying degrees of temperature. The undercoats, having had their share of suppleness imparted to them, so that under stress they may respond to the strain put upon them, the next move must cover the necessary elasticity for the coats above. The roughstuff, naturally, must go to the surface with a percentage of brittleness in its composition, in order that it may have the rubbing property. When this foundation has been rubbed out, set aside for the evaporation of moisture, and then coated with color, this color being charged with elasticity by the addition of raw linseed oil, and then given a coat of varnish color made of an elastic rubbing varnish, we have the supple base for the reception of the elastic varnish coats. In the event of using enamel, in place of the color and varnish color, the same percentage of elasticity should be provided; above this base we have an elastic body finishing varnish to carry out the elastic method for the steel surface. In this manner it is possible to insure a degree of elasticity for the finish ample to meet all the demands of the widely varying degrees of exposure.

—1947—

Better Locomotive Painting.

Interviewing a foreman locomotive painter recently, whose opportunity for observation has been ample enough to give his opinion weight, the remark was brought out that, at the present time, better painting and finishing of the locomotive is being done than formerly. The opinion was advanced that, as a result of the war, it has been found desirable to give the locomotive equipment thorough painting repairs while in the shop, with the intention of keeping the equipment in service for a longer period between shoppings. This is a view that will be heartily seconded by master locomotive painters in general. It has been felt for a long time that this class of equipment has been given insufficient painting

repairs, and as a result of this cheaper painting practice, the motive power has suffered both from the point of appearance and service rendered. The tissue paper paint and varnish film has been found inadequate to meet the sort of service the locomotive equipment is constantly exposed to. There has, for two or three years past, been an insistent demand, perhaps only imperfectly voiced, for a better class of engine painting repairs. At last motive powers and even the general manager's office have recognized the character and the importance of the demand for the better class of work to come from the painting department. Today, in many shops, we find this change of view in respect to this matter being emphasized in the most practical manner possible, i. e., in the form of more and better painting and varnishing repairs. This will mean more importance to be attached to the painting department; greater prosperity, and a larger interest rate for the company upon its investment in motive power, and greater efficiency for that motive power. Perhaps none of us would wish to see the return of the sensational style of ornamenting the locomotive equipment once in vogue, but in the more thorough painting of those parts in sore need of substantial protection there is practically a unanimous call. The locomotive tank, cab, headlight, headlight brackets, sand box, dome, bell frame, steam chest jacket, cylinder cover, number plate, driving wheels, truck wheels and steam chest saddles as of old time need a fine measure of good surfacing and painting and varnishing, with the other parts of the "iron horse" treated to a splendid coat of black. Then we shall reappear with a round meed of praise for the thrifty and inexhaustible train hauler; then, too, the owners of this Samson in black will perceive the profit of thorough painting.

—1948—

Ample Protection for Important Car Parts.

The roof, deck or clearstory, and the underside of the floor constitute parts of the car which are entitled to the best possible protection. In earlier issues of this department the urgent need of protecting these parts of the car has been pointed out briefly. A recent examination of a considerable number of roofs, clearstories, and floor under-surfaces, of steel passenger cars has convinced the writer that, at the points indicated, the life of the car is determined in large part. These are the points at which the rust and corrosion begin to gnaw, and, unmolested, continue to gnaw until the steel is eaten through and the collapse made complete. It has been said that eternal vigilance is the price of keeping the metal surface out of the jaws of the rust demon, but this vigilance avails little when the periods between shopping are protracted and so long drawn out that the corrosion grows and thrives and gets beyond the ability of the painter to arrest it. When the car is shopped and the screens are removed, as they should be, the removal of the developed rust should go down to the very metal itself, otherwise the corrosion, like the canker that it is, continues to take toll of the life and vigor of the steel. This is a big undertaking, to be sure, but it is the only way whereby the disease may be arrested and the car saved for another run of service. In quite the same way must the effort be made to maintain the bottom side of the floor. These steel panels are shot through in comparatively short order, once the rust gets a foothold; they are down out of sight and their decay is therefore all the easier. But it must be considered good railroading to see that the rust be held at bay under the car just as determinedly as at the apex. The first step in the matter of stopping the rust blight is to remove the rust, using steel scrapers, emery paper, files, sandpaper, and, when possible, the sandblast, the last named being the only sure remedy. Anyhow, get all the corrosion possible off, and make the surface clean and sound. Then coat up with a pigment carrying oil enough to insure a perfect adhesion, and with a tenacity of film equal to rawhide. This for the roof and clearstory, and a second coat will be in order for the same parts. The under side of the floor usually receives a coat of black paint, carbon, etc. If this can be sprayed on, so much the better; it may be in this manner worked into every crevice and cranny where it belongs. Paint these parts often and well and thus safeguard the life of the car.

—1949—

Excess Painting and Varnishing.

Master Painter Charles E. Copp, some twenty years or more ago, made the observation that "over-painting and over-varnishing, like over-loading the stomach, are the foundation of many troubles." It was said then, and it is probably true today, that "there are ninety-nine per cent. of the people in this country who are dying from some form of dyspepsia, caused by over-eating and eating in a rush, to one per cent. dying from lack of sufficient food." It would not be a just comparison to say that this percentage, or anywhere near it, today obtains in the over-painting and over-varnishing of passenger car equipment. It is fair, however, to say that no inconsiderable amount of excess painting and varnishing must be performed upon the interior of the steel passenger mail, baggage and express car, since it is elected that the larger part of this equipment should go in a paint and varnish finish. In the old days, when the natural wood finish for the interior held sway, it was an excess of varnish coats which kept the master painter on the anxious seat. The problem of removing this bulk of material was less formidable than that of stripping off the mass of paint and varnish piled onto these interior surfaces under present practices. The paste varnish remover quickly fetched the varnish fabric off cleanly, and while paint and varnish removers will perform the trick today, the removal of this deeper, and, if anything, pastier mass of material is a more laborious and costlier job. The painted interior must nevertheless be kept in fitting repair, both in the matter of paint and varnish, and the only alternative is to do the thing first at hand to develop the finish that will pass muster. In case the interior is grained in imitation of mahogany, the task becomes simplified, for it remains simply a matter of keeping the surface decently protected with varnish, in order to get at least several years of wear out of it, with nothing more bulky than the varnish to accumulate an excess body of material. With the painted interior, a different set of conditions are encountered. In order to maintain the surface in a presentable appearance, the discoloring of the field pigment must be overcome periodically through the application of a fresh coat of color, and thus the practice of over painting goes on. If the practice of graining the side walls of the steel car interior becomes universal, this excess painting, for the interior at least, will shrink to a minor matter, and the master painter may walk upright with another vexation put to flight.

—1950—

Steel Truck, Platform and Underframe Painting.

The day of the wooden truck and platform has gone the way of the side-bar buggy and a bigger problem in painting these parts of the car has come into reckoning. The steel platform, truck, underframe, etc., have brought rust, corrosion and the general decay of the running gear of the equipment into review and, among other things, have done away with letting these parts go with a coat of oil paint brushed on by some cheap help. Rust and corrosion are the natural enemies of the trucks and platforms of the steel car, and like the roof and clear-story, they must have prompt and thorough attention, with cleaning and scraping and grinding off of the rust and decay prior to painting. In one shop, with which we are acquainted, the practice is to scrape the rust sharply off the platforms and give them a coat of metal primer. This also holds true of the trucks, when corrosion has set in. This is allowed to dry hard and sure, after which the parts are sandpapered down well and finished with at least two coats of good truck enamel. The underframes, girders, beams and framework generally need close attention. Before repainting, upon shopping of the car, all corrosion needs to be scraped off. Then with some reliable pigment, coat these parts of the car. Turn this work over to some painstaking man who, upon being well paid for his labor, will see that it is well done. If shop conditions and arrangements are such that the paint can be sprayed on, this will be found the cheapest and quickest way to handle a class of work very undesirable, at best, to perform with a brush;

moreover, with the paint atomizer or spray, the paint may be driven into crevices and corners touched with greatest difficulty with the brush. The principal thing, in painting these underparts and trucks and platforms, is to clean off all the rust possible, and then to get a good, substantial fabric of paint or enamel in place. Keep these parts in mind, along with the other parts of the car, and at each shopping see to it that they receive their share of cleaning and painting. In this manner the running parts and the supporting frame of the car may be made to do their share of revenue collecting. It has been claimed that these parts of the car are more or less covered with grease, which of itself is a protection, but the fact remains that once rust starts it spreads despite the grease and oily accumulations. Cleaning and painting, then, offers the surest and most certain remedy.

—1951—

Better Painting of Steel Equipment Needed.

The need of thorough going methods in the preparation of the steel car for painting is urgent and vital. A very practical steel worker lately said to the writer that "it is not so much the need of more painting as it is the need of more thorough methods of preparing the work for painting that is today confronting the master car painter. The steel coach," said he, "is going to the scrap heap by way of the corrosion process faster than through the ordinary mediums of wear and tear." It will be admitted by careful observers that this contention is, after all, not far from the correct one. This corrosive attack, moreover, is being delivered, for the most part, in and about the deck or clear-story, back of the screens, around the deck sash, or the ventilators, etc. Wherever moisture is able to nibble and squirm in and fasten its rusty tooth, there you may expect to find the blight of decay and corrosion doing its deadly work. The serious drawback, as it appears to most of those in a position to know intimately the real condition of this corrosive issue, is that, for the most part, work is pushed through the shop at a rate that does not permit the thorough going processes necessary to check the action of the rust. There are, of course, methods for counteracting the trouble in practice, but in the majority of cases they are superficial and fail to get down to the very first causes of the corrosive action. The issue has been raised, by a master painter of repute, that when these conditions are found to exist upon the car, after a very close examination—and such examination should be given every car, without exception—the screens, to begin with, should be sandblasted; also the other parts, if available. At any rate, the clear-story or deck should have a scraping and emerying and sandpapering process applied to it, and to all the parts connected with it, that might suffice to fetch the rust scale, and the corrosive splotches, quite completely off. Then by a system of ample coatings with some good reliable rust inhibitive pigment, rounding it all out with a couple of coats of enamel, and a coat of varnish of equally good caliber, the parts will be strongly fortified to resist the rusting propensity.

The situation, in brief, is this:—At the car building factory the initial painting has been performed possibly without going to the bottom of the rust issue. The rust gets seated before the first coat of material is applied, and under this blanket of pigment it continues, canker like, to eat its way until, at about the first shopping of the car, following its exit from the factory, the corrosion is found to have spread and gnawed into the very vitals of the construction. To paint over the surface thus diseased is simply to postpone the inevitable day, when nothing short of rebuilding will serve to give the equipment a new lease of life. Either this or the car must go to the scrap heap—shall we say prematurely?

Another part of the car to whose needs the painter must be constantly giving attention is the bottom or exposed side of the floor. These steel panels are being found to rust through, in many cases, at an early day in the life of the car unless given careful cleaning processes and painting. Frequent painting will help, it is admitted, but unless the corrosion is chipped off and the sore sterilized, the disease naturally must continue, the painting serving to merely conceal from inspection the character and extent of the corrosive action. Frequent and ample painting,

it is granted, will prolong the wear of these rust afflicted surfaces; just how long data is not sufficient to give any reliable summary.

Some twenty-one years ago a hopper car, built all of steel, was put into service. We believe this car is the property of the Bessemer and Lake Erie. The record of this car is to the effect that it has been kept very well painted. Some of the doors and hoppers and some floor panels have been replaced, and some other minor repairs made to the car, and it is reported to promise at least several years of service. This record, however, can hardly be duplicated in the history of other steel cars, especially of this type, for in the meantime many hundreds of steel gondola and hopper cars, at a comparatively early age, after fairly good painting repairs having been applied, have gone to the scrap pile. This has been due, we are told from a source of authority, to the rust blight which, despite the application of frequent coatings of paint, weakened the sheets and underframes to an extent that failed to warrant further repairs. It is understood, of course, that the mediums which affect adversely the steel passenger car are different from those which affect steel hopper and gondola and freight cars, but the one fact appears to apply to all, namely, the need of frequent painting in order to develop the best wearing qualities possible, and wherever and whenever it is available to use the most effective methods in ridding the surface of the accumulated rust prior to painting.

It is certain that, in line with the war time economy being practiced on all railways at this time, the better care taking and conservation of all steel car equipment is sure to pay handsomely. The steel freight car, which is now coming into being, is certain to demand the best possible attention, and it would seem a most logical step to keep this equipment frequently painted as an initial means of keeping the rust well under subjection. Perhaps a more thorough plan of inspection of this, and in fact of all steel car equipment, is the one first step in the matter of giving this equipment the adequate and timely protection which it needs. One road the writer has in mind practices the scheme of examining the equipment at terminals—speaking now of passenger equipment—and upon disclosure of any evidence of rust applying at the lay-over point an ample coat of pigment. Some years ago there was considerable discussion among railway officials relative to the profit of keeping steel hopper and coal cars well painted, and although, at the time, there appeared to be a wide diversity of opinion concerning the subject, with not a few of the higher officials adhering to the view that it was not entirely profitable, except when new panels were applied, we believe that this opinion has undergone, within recent months, a change directly in favor of better painting methods for all steel equipment, whether passenger or freight. This change of sentiment is probably due, in part at least, to the recent enormous advance in the cost of all railway equipment, and through it, if carried into effect, a substantial saving may be realized. The estimated cost, labor and material of painting steel hopper, coal and ore cars, varies from five dollars to ten dollars each per coat, and on this basis, at the present war time prices of everything entering into new equipment and replacements, there would seem to be no question as to the profit of the painting applied. Perhaps, in case of the steel passenger car, we are able to speak more specifically, and without quoting the dollar mark, to say that thorough painting, going to the root of the rust, is the life of the car.

—1952—

Working Out Paint.

Paint, however coarse it may be, and whatever its station in the detail of the finish it may be destined to hold, should be worked thoroughly out; only in this state is it prepared to give a normal measure of service. Real paint service is obtained only when a uniform distribution of pigment is given each coat. The paint just simply piled on, as some men apply it, is far from being in a condition to yield an attractive appearance or to furnish the right kind of durability. There is a lot of good paint wasted in this way. When put on, as above stated, it surely is wasted; it soon cracks, flattens out without life and

looks coarse and unfinished. All paint, it is well to tell the new men who evince a show of the amateur, needs to be thoroughly brushed out to the extent of securing a uniform distribution of material; it should not, however, be brushed to death, for, if anything, the latter state of the material is then worse than the first. Brushed to secure a uniform covering and distribution of pigment is the proper way; more than this is excess, and should be avoided.

—1953—

Various Ways of Getting a Surface.

Assuredly there are divers ways of bringing out a surface quickly; the main thing to know is the way to do this not only with a reasonable degree of speed, but in a manner to insure the maximum durability. Since the introduction of the steel car, methods of fetching the finish out in its finest estate, in the briefest possible time, have been as plentiful as the heirs to a big fortune. After all these various ways have been exposed to the cold examination of unprejudiced observers, the fact remains that, out of this collection, there is one main consideration to be reckoned with, to wit:—Serviceable quality. What is the method that will insure this feature? First, a good quality of material; second, sufficient thoroughness of surfacing to bring out good appearances and an excellent wear and tear quality. Sandpaper mediums have been extolled as methods which offer quick and good ways of developing the right base to finish upon. As compared to the method of putting on a sufficient body of surfacer to enable rubbing out with water and block pumice stone, the plan of using a thin body of sandpapering material, and building out of this a base smooth and level enough to place the varnish with a fair show of having it appear rich and ample and able to meet all the varied attacks of road strife and stress, the latter way shows a defiant disregard of all the laws governing paint department issues. Under the sandpaper plan, the surface may be smooth, but it is not possible to make it level because, first of all, there is not a sufficient body of pigment to permit working down to a level. What is needed for the finish is both a smooth and a level condition of the surface; lacking this and the finish, despite the most expert treatment, must fall short of the standard quality as recognized by experienced mechanics. By this standard the sandpaper method of getting a surface is a losing investment, even when two or more coats of this class of surfacer is employed. Not only is this one important disadvantage, but another comes quickly into view. It is this:—A lack of depth of supporting pigment. The sandpaper method offers very little of this, and that little of the poorest sort. To be sure, the steel coach sometimes affords a surface so level and well groomed that the tissue paper coat of material, sandpapered down to a smooth shape, furnishes a fairly decent base to flow varnish upon. These are the exceptions, however, not the rule.

—1954—

Maintaining Sanitary Conditions Inside the Passenger Coach.

Maintaining the passenger coach in a sanitary condition on the inside is, with most roads, we dare say, considerable of a struggle kept up persistently. Federal and State regulation has grown to such proportions that the average railroad is in the position of the small boy astride the fence with an angry bull on either side of it. Once the car gets away from the paint shop, after the regulation repairs have been applied to it, the cleaning operations are for the most part of a superficial character. At the terminals, granting that they are equipped amply with all manner of facilities for quick and good work, there is more or less of the spirit of "let us do the work and get out quick" in evidence, with the result that the interior of the car is not cleaned thoroughly enough. Out of the way places are let go; the spaces back of the heating pipes, and under the pipes, back of the hoppers in the toilet rooms, and in the corners of the main rooms under the seats, are all traps for the catching and retention of a great variety of

refuse and filth, often of the most loathsome sort, and into these corners and crannies the broom and brush, licking at the dirt under short-arm jabs, scarcely ever swoops, with the result that when the car comes into the paint shop for general painting repairs the master painter finds "something rotten in Denmark," "But don't blame 'the boss' cleaner," you remark; "poor devil, he's doing the best he knows how, and with the chance afforded him, the help given him, the time at command and the facilities furnished him, the great wonder actually is that he does not do worse." And so willing to concede a point, we let this phase of the matter drop and return to the situation as it confronts the painter when the car lands in the paint shop. When it emerges from the shop, spick and span under the magic spell of a fresh supply of varnish, the management, of course, expects that it is every whit clean—that not a spot as big as a gnat has been left uncleaned and unsmearred with some manner of protective coating. Wherefore, as intimated at the beginning, developing a sanitary condition is no mean and minor job, for it calls for a lot of dirty work, scraping and scrubbing in the litter and foul matter begotten of travel and wassail, and making the disease-breeding spots decent and clean. If it were possible to have a more sanitary system of terminal cleaning, regularly observed and practiced, it would be a comparatively easy matter to keep the passenger equipment at all times in a condition to pass inspection. Except at the main terminals, we believe that the system of car-cleaning for the car interior is too superficial and lacking in thoroughness. What the average car needs is thorough cleaning systematically performed at all points where such work is done. When this work can be so done, then for the master painter the problem is greatly simplified and rendered easy of solution when the car comes in for the general painting repairs. The traveling public admires a beautiful car interior, but to no less extent it also admires a clean and perfectly sanitary one. Speaking for the master painters, we believe that they are more than willing to do their part, but they can discover no means of "coming more than half way."

—1955—

Passenger Car Lettering.

A Western reader of this department writes in complimentary words concerning what he terms the legibility and generally excellent style of the lettering, or, if you choose, the sign-writing, applied to passenger equipment cars. He maintains—and with this opinion we cordially agree—that only a high class of workmanship, coupled with an artistic turn of mind, could accomplish what we Americans are every day privileged to see as examples of passenger car lettering. That there has been a decided improvement in the style of lettering applied to railway passenger equipment during the past fifteen years will be conceded by all careful observers. Here and there, it will be admitted, are to be seen freakish and outlandish examples of passenger car sign work, but on the whole the quality of this work is of a fine order. Simple in design, plain in outline, distinct and readable at maximum distances, and under conditions usually a hard tax on the vision, with real elegance and dignity of structure, the modern passenger car sign work is quite unsurpassed in all points of essential usefulness. Fault has been found, and at one time it was justified, with the rule of thumb design of car sign work. It has been claimed that the letters and numerals were rigid and inflexible, quite like something which the carpenter might hew out of a block of wood. In other words, there was a mechanical exactness about the work which made it highly distasteful to critical minds. Some oversensitive souls decry this latter feature. Most of the criticism, deserved or otherwise, in former years has no standing in the court of public opinion at the present time. A certain mechanical exactness, considering one letter or numeral in its relation to another, will be perceptible to the professional signwriter used to working without the restraints imposed by a uniform standard of style and effects. But to even the critical student of signwriting this so-called mechanical exactness of style and design will scarcely excite attention. As a matter of fact, this mechani-

cal feature dwindles down in size to a mere atom in the ether. Necessarily, in all railway equipment lettering there must be an established standard of size and design, and it is this requirement which more often than not provokes the term "mechanical." Lettering applied to the passenger car must necessarily conform both in size, style and position to the size and general construction of the car, and with direct reference to the space assigned it. Advertising possibilities must also be considered, to serve which clean, plain and uniformly effective lettering is the thing most worth considering.

—1956—

Effect of Varnish Upon Colors.

Varnish effects an influence on colors that is at once important and of vital concern to the painter. The painted interior of the steel car, the outside surface with its various treatment of colors, and the color combinations in general which the master painter has business with, all confirm the fact that varnish has much to do with the tone, and tint, and shade, and natural brilliancy of colors, in some cases affecting them injuriously, and in others having no appreciable ill effect.

It is an established fact, however, that most dark colors, at any rate, if varnished over before they are thoroughly dry—hard, indeed, from top to bottom—will show a shade varying often to a remarkable extent from the natural one, and on the same panel, in the event of the color lacking a fraction or two of being quite dry all the way through. Black is little, if at all, affected in this way, although "hair checking" and even larger fractures of the surface result from choking the color under a prematurely applied blanket of varnish. Varnish is almost ruinous to a blue, the light shades of blue being less affected by the varnish than dark ones. The varnish should cover enough of the blue in it to counteract its discoloring properties. Like the greens, and all other dark colors, excepting the black, blues should always be given twelve or fourteen hours to dry previous to coating with varnish. Ultramarine blue, which the car painter sometimes has occasion to use, is not a difficult color to work out on the surface, provided the proper ground color is given. Carriage painters, next to the ready prepared ground colors for blue now procurable in the markets, favor lampblack and deep brown, made of Indian red and ivory black, for ultramarine blue.

On some roads in the South and Middle West certain lake effects are employed to set forth in sharp contrast harmonizing deep shade pigments. Tuscan red and black make an admirable ground for not a few of the lakes. A straight Tuscan red of rich effective tone will serve when a light ground is wanted. However, speaking in a general way, lakes are rich in proportion to their depth, and the deep, fine tone of a majority of the lakes will be destroyed by a light ground color.

—1957—

Mixing Gold Bronze Powder.

While gold bronze powder as a medium to be used in painting and finishing passenger equipment cars is swiftly going out of fashion, in nearly all railway paint shops there is some of this material being used, and with some painters it is quite a problem to mix the powder, when procured in dry form, so as to develop the true brilliancy of the bronze and make it wear durably. One of the first steps along the way is to procure a good grade of bronze—the pure gold bronze, of course, being the best. Next, the mixing, the ways of which are in number as the automobiles which loiter in the highways.

Some painters find the common brass lacquer thinner a most excellent bronze thinner, while others use two-thirds pale drying japan and one-third elastic finishing varnish, while still others use straight gold size japan, turpentine being employed as a pencil dipper. Quite another formula, as we remember it, was years ago offered by J. G. Keil, now foreman painter at the Elkhart, Ind., shops

of the L. S. and M. S. Ry. Mr. Keil's method was to take the required quantity of dry bronze the day previous to using it and submerge it in benzine. The morning after the benzine, which in the meantime has drawn out and become saturated with the verdigris from the bronze, is poured off. The bronze is then mixed with gold size japan and thinned with benzine. Rapid evaporation will naturally make it necessary to add more thinner and gold size japan from time to time. Turpentine, if substituted for the benzine, will retard evaporation, and on account of insurance regulations it may be necessary to use it. We believe Mr. Keil stated at the time that bronze prepared according to his formula covered better and on every set of hat racks made it possible to save anywhere from forty to eighty cents. It was further claimed that his method stopped the gold from oxidizing when exposed to the atmosphere. The sulphuric gas contained in coal smoke attacks bronze, turning it black; formula is recommended to successfully counteract the sulphuric gas effect.

—1958—

What Constitutes Good Varnish Service?

The above question has been received by this department from a reader in the Middle West who is connected with a railroad of note in that locality. The question is contingent upon the circumstances and conditions prevailing in the particular section of country where the varnish is exposed for service. What would constitute good varnish service on the passenger equipment cars on the Boston and Maine might fall far short of that quality on the Southern Pacific, Canadian Pacific, Santa Fe, Illinois Central or upon some one of the roads operating in the extreme southern parts of the United States. The equipment on these various roads is exposed to widely varying conditions of service. Atmospheric conditions run from extreme heat to extreme cold, from moist to dry. Then, too, road conditions differ greatly.

The exposure of the equipment upon roads in the prairie country differs radically from that of equipment operating through mountainous country where tunnels and valleys and lofty altitudes are traversed alternately. No definite conclusion as to actual varnish service can be reached unless the conditions here noted are given due consideration. Even to assume that all varnishes are created equal, which they are not, would not materially assist in discovering the measure of varnish service on the railway passenger equipment of this country. What would constitute good service on one road might, by reason of sharply differentiating conditions, prove very inferior service on another road. At a number of conventions of the Master Car and Locomotive Painters' Association members have heard statements advanced concerning the durability of varnish which have doubtless aroused a questioning attitude of mind in some quarters. The varnish on a coach running between New York and Buffalo, which has worn well for a period of twelve months, would hardly be able to stand up under the strain of an equal period of service over the Northern Pacific or over the great arid southwestern section of the country. Primarily, then, we may believe that a standard of varnish service should be established to an important extent, at least, by the individual or corporate buyer and consumer.

No single standard, it is fair to say, can be set up which may be used by all the railroads, or any considerable number of them, to determine accurately the various degrees of varnish service. The law that makes one man's meat another man's poison precisely in the same way makes good varnish service possible on one road and impossible on another. Upon some roads in this country passenger equipment cars varnished annually give their owners entirely satisfactory results. Indeed, this may be declared the practice of the average American railway. Upon many roads, however, even where extreme conditions do not prevail, it is questionable if such a practice furnishes the highest economy. As a matter of fact, it is the writer's belief that the equipment on many of these roads, if varnished twice a year, would give an appearance and a measure of service in every way warranting the practice. When varnish wears to a certain plain and unmistak-

able extent it should be revarnished, and there is no economy in deferring the work. It remains for the master painter marshalling all the facts in connection with the prevailing conditions of wear to which the varnish is exposed to establish the value of the service rendered.

—1959—

Sandpapering.

Sandpapering is a work from which much good may come, while again it may be fruitful of great harm. When you perceive a painter cuffing the surface here and there with a piece of sandpaper held carelessly in his hand, catching the edges of the battens with a muscular rasp, nipping exposed corners to the bare wood, and indulging in a series of rough-house plays which threaten to uncover the vitals of the surface in some places and let other parts go unscathed, you may very surely set the man down as a menace to good work. If an employe of this sort can be taught, then by all that is great and merciful, teach him. If he is unteachable, then true to the Safety First movement transfer him to the boiler making department or pick him a job scrapping obsolete locomotives. At any rate, persuade him to vacate the paint shop.

Sandpapering is in a class by itself. It deserves to be well done. In fact, that is the only way it can be done and be called sandpapering. It is, of course, a job which the average man finds difficult to get interested in. The actual results of the work do not show until all the following operations are completed. Then, indeed, is the good or the ill manifested.

Somehow the importance of this work has been allowed to degenerate, and men have grown accustomed to consider it a mere laborer's job. It belongs in the class of highly skilled labor, and men should be taught to respect it as such. The workman who can do a really thorough and neat job of sandpapering—getting a smooth, uniform reduction of the paint film everywhere over the surface—is always in demand.

On the outside of the car today there is much of this work to be done, since there is no rubbing or surfacing of the varnish coats. The real surfacing, except on equipment worked up in roughstuff and rubbed with water and brick, must be done with sandpaper, and this being true, it is the fit and proper time to revive interest in the work and make it do more perfectly the things it is expected to, and if properly practiced will do. The new fangled methods and systems of surfacing and of making car painting easy are all well enough, but none of them will do more, nor are they more efficient, than the good old honest work of sandpapering performed in season by skilled and trustworthy craftsmen.

—1960—

The Circassian Walnut Steel Car Interior.

The edict has gone forth that for the interior of the steel car mahogany is not hereafter to be the exclusively employed finish. Circassian walnut has been slated to share the honors with mahogany, and in some of the largest car manufacturing plants of the United States, steel car interiors are being painted and grained in imitation of the far-famed native wood of the Black Sea and other Asiatic countries. Circassian walnut has long been one of the world's best known and most expensive cabinet woods. Single trees containing choice hurls or fine bird's-eye figures have, within recent years, sold for more than \$3,000. The wood possesses a beautiful grain and figure, delicate tones, and a velvet texture unsurpassed in any other known wood. The most beautiful varieties come from the foothills of the Himalaya Mountains, and from the mountains of upper Burma. It is said to have been widely planted in Europe and the United States under the name of English walnut. The high cost of Circassian walnut has led to the substitution of American red gum wood and of other woods, which have been sold under the name of Circassian walnut. The common

butternut, also known as "white walnut," is very similar in appearance to the less attractive varieties of Circassian walnut, and in some sections of the country has been marketed under the name of the latter. The fact that this wood is being imitated for steel car interiors, at least promises a novelty in finish likely to have a considerable run of popularity. Some very exquisite and wonderfully attractive examples of Circassian walnut are now being displayed on a good many steel car interiors, and a good imitation of this wood affords, both in color and grain formation, a wide departure from the ever gracious and splendid mahogany effects. Gold leaf or imitation of gold leaf, striping effects, edged with a fine line of black, or accompanied by a distinct fine line of black, furnish a decorative feature for the walnut graining of exceptional attractiveness. This color to be set forth in its finest estate requires not only a very smooth, clean groundwork, but should itself be worked out clean and smooth on the surface. Then over all should be applied a strong body of varnish consisting of, for best service, not less than three coats of varnish, and for the very highest class results, four coats. Then rub to a subdued gloss finish and you have Circassian walnut properly protected.

—1961—

Covering Strength in Colors.

The actual value of covering power in pigments is often overestimated by the car painter. This is due very largely, no doubt, to the railroad spirit which teaches men speed in almost everything they do. The color that covers up densely and has sufficient opaqueness to furnish a blank solid surface with the minimum number of coats is accepted very largely without question. However, it is well to keep in mind that the opaque properties of a pigment are not always the most important. The greatest value of a pigment is often derived from its translucent or transparent quality. A word here as to translucent pigments. Translucent is a term which applies to substances through which a certain amount of light is conveyed. By the measure of that light, generally speaking, the luster or brilliancy of the pigment is determined. There are many translucent colors, and almost invariably they excel the opaque ones in the points above mentioned. A transparent pigment is one through which figures or outlines may be traced from the surface beneath. A piece of sheet steel is opaque; many kinds of writing paper are translucent; clean glass always transparent. The so-called transparent colors, such as carmine, ultramarine blue, crimson lake, and so on, are really only partially so; strictly defined, they are more nearly translucent than transparent. All such colors have a brilliancy and a tone foreign to the opaque colors. Opaqueness, then, or covering power should be respected merely for what it stands for. In car painting and finishing surface brilliancy has not altogether passed out of the listed requirements, and for this reason let us give a right distinction between these variously designated pigments.

—1962—

Matching Color on the Railway Coach.

Here is a class of work exceedingly difficult to perform well. Expertness in it, while due in part to practice, is primarily a gift. Choosing from a paint shop force of fifty or more men you will seldom find more than one who can go to the stock room and, without any waste of material, correctly match any one of half a dozen different shades of color presented to him. Only a colorist—one with an acutely developed sense of color—can do this work successfully. Even in the case of one gifted with the natural color sense considerable practice will be necessary before such work can be taken care of promptly and without waste of material. It may be that this natural aptitude—or call it what you will—is possessed by some obscure or less generally skillful workman than even the rank and file affords. But wherever found the man should be encouraged to

develop his gift and the matching of colors, and the work relating to it should be assigned to him as a part of his shop duties. It is always advisable, when possible, to have at least two men on the shop roll expert in this line of work, for emergencies are constantly arising when the services of the second man, or understudy, will be required.

—1963—

Brush Coats and Flowing Coats.

The distinction between brush coats and flowing coats is sometimes misinterpreted, and practically always to the disadvantage of the master painter. A flowing coat represents a process by which more material at one application is put in place on the surface than can be accomplished with a brush coat of material. There are, however, coats which must be brushed on, and still other coats which are brushed on which, if correctly applied, should be flowed on the surface. All surfacing and color coats are necessarily known and should be so regarded as brush coats, with the exception of certain steel primers, and thin sealing or sand-papering coats. The distinctively flowing coats are the varnish coats, and coats made up, in part, of varnish and of color. All such coats, while necessarily applied with the brush, fill their appointed office only when flowed upon the surface. A strong percentage of varnish used in the composition of any material creates in the mixture a flowing property. A lack of varnish renders the material incapable of flowing out to the desired state of smoothness, and it, therefore, becomes a brush coat product. This offers an explanation why varnish color coats, flowed on, take on a depth of tone and a brilliancy which brushed on coats never show.

—1964—

Oil and Pigment and Their Relation to Durability.

A comparatively few years ago, as years run on, the old axiom that "oil is the life of the paint" passed almost undisputed. Compared to the time taken to paint a car or carriage at that date under the above rule with the time required today, with a restricted employment of oil, we now have, considering the matter broadly, greater durability than formerly. This proves, if it proves anything, that oil and pigment are, first of all, mutually reinforcing—that no painting depends for its durability alone upon any one ingredient. Like human society, which depends for its highest development and usefulness upon the units composing it, the most desirable paint used upon the railway coach, freight or coal car is that in which there is a certain fixed unity existing between the pigment and the vehicles employed. Even the japan ground color used upon passenger equipment cars should have, when being broken up for application, a reinforcement of raw linseed oil. Opinions differ as to just what the proportion of oil to turpentine should be for such work, but this much seems assured:—For first coats of color, which in a good, warm shop are supposed to dry in from two and one-half to three and one-half hours, one part of raw linseed oil to six parts of turpentine will serve to bind the color securely without creating any repellant surface condition. When it can be arranged to allow the fixed coat of color to dry over night this proportion of oil can be adjusted to, say, one part oil to three parts turpentine. Such a mixture will furnish a good elastic first coat, and while oil need not be accepted as the life of it, both the oil and the pigment, acting in unison, provide durability for the structure. The addition of varnish as a binding medium for japan ground colors has not been approved by experience. Varnish so added to the color forms a very close surface, acting, if anything, in opposition to the varnish, certainly furnishing it no cohesive aid. Quite as soon as we can get away from the time-honored notion that "oil is the life of the paint," and accept it as furnishing a certain proportion of life-giving elements, then we shall surely know more concerning the actual value of an indispensable material.

—1965—

Redivivus of American Walnut.

Is American walnut to find worthy imitation on the interiors of steel passenger cars? For years mahogany has been supreme. In these columns some months ago attention was directed to the fact that the interiors of steel cars on some roads were being grained in imitation of Circassian walnut. There is magnetism in this wood and in its correct imitations, and it is prophesied by men in a position to feel somewhat accurately the pulse of public taste that these Circassian imitations on the inside of the steel coach are to become exceedingly popular as time goes on.

Not alone in the above species, however, is walnut to be represented on the interior of the steel coach. Scarcely had the present year been ushered in when developments in the furniture field disclosed the wide-spread campaign in favor of American walnut of a pattern distinctly finer and more likeable than that which craved public favor in the early 70's. American walnut—black walnut, with emphasis on the black—as it was finished forty or more years ago, was principally suitable for houses of mourning. It was then a sour and solemn visaged wood, with none of the beautiful and attractive features characteristic of the present-day American walnut. It went out of style because the furniture trade refused to confer upon it anything more than a black and sorrowful smudge. It has returned to popular favor with the same trade giving it a gay and beautiful finish, with just enough of the ebony tracings to furnish it a fashionable dignity.

This recently developed popularity is more than likely to be sustained, because it has been shown by manufacturers that there is still a supply of this splendid wood, and that this supply promises to be ample for many years to come. As the traveling public welcomes this old friend in a new and nobler guise to its home, so in turn will the friendly imitation of the brave old wood find a welcome on the steel coach interior. American walnut has "come back," and in the near future, we have reason to expect, it will be sharing the honors in "counterfeit presentment," with mahogany on the inside of the swift-gaited steel palace.

—1966—

The Sashless Deck—Its Advantages to the Painter.

One of the latest type of steel passenger cars presents something of a novelty in "upper story" construction, this novelty being nothing less than a deck without sash and therefore without natural lighting facilities at a point in the car hitherto very well taken care of in this respect. The more one gets acquainted with this type of car construction the more sorely tempted he is to ask why this improvement has been so long deferred. At any rate, he is at once led to question the advantage, if any, of the car deck equipped with sash and glass. Dirt, smoke, gases, and dust, were constantly gaining access to the interior of the car through the imperfectly fitted sash, and the amount of light reaching the passenger by way of the deck sash glass would contribute nothing to his comfort. The practically inclined traveler looked upon the deck sash glass as an annoyance rather than a convenience. With the elimination of the sash paint shop processes are considerably simplified. The interior of the car can be scrubbed and finished quicker and at less expense, and practically the same thing may be said of the exterior. All things considered, the sashless deck is an improvement in car construction which the car painter can with good reason look upon favorably.

—1967—

The Advantages of Good Tools.

Not long since the writer was told by a well known and successful foreman car painter that no inconsiderable part of what he had succeeded in accomplishing in his railway departmental work along efficiency lines was due, and con-

tinues to be due, to the use of good tools. Brushes, he urges, should be of the best. There is no economy, he desires us to point out, in using brushes until they are so worn that the paint, or color, or varnish, cannot be evenly and uniformly worked into corners, panel intersections, joints, and surface construction of various forms. All such parts of the car, when out in service, are exposed to an exceedingly severe sort of wear, and unless well protected by paint and varnish, the wood and metal are soon subject to decay and corrosion. The brush, worn below a certain point, is lacking in elasticity, and the brittleness which takes the place of suppleness quickly results in the bristles breaking off in short stems and particles, these latter being then distributed over the surface. This develops the dirty surface, full of roughage, and weak in wearing quality by reason of this condition.

There are latent possibilities in the good brush which only the user can develop. The good brush user can develop none of these in the inferior brush. Good brush work means more durable work, other things being equal, in addition to a proportionately increased efficiency both in labor and material. There is always a greater—an enormously greater—waste of material connected with the use of the poor brush than with a high-class one. Appearances, too, must be reckoned with, when considering the use of brushes. If a good finish counts for anything—and we are free to think it does—then the choice must fall upon the superior brush, estimating its value alone upon what it is able to produce in the hands of a competent workman.

More and better work can be performed at a less outlay of energy and labor with the good brush—with the good tool of any kind, in fact—and from this standpoint alone, buying and using of the superior brush amply justified. In some railway paint shops where brushes of A No. 1 quality are used, of a size rightly proportioned to the size of the surfaces, the piece work price for coloring and varnishing cars is today twenty-five per cent. less than what is paid for the same items of work by other roads known to the writer.

—1968—

Painting the Car Floor.

A foreman car painter, who declares himself to be “an appreciative reader” of this department, writes for any suggestions which we may have to offer concerning floor paints. He advises that his company has had, within the past two or three years, several claims for damages to settle resulting from soiled clothing, due to imperfectly dried floor paint. The matter has become serious and our friend is anxious to avoid a repetition of the trouble.

This trouble, in a form more or less serious, has been forced upon the attention of master car painters for years, although in earlier years it developed less frequently by reason of the fact that the time allowance for painting the car was about double what it is today. All the coats of paint and varnish were given greater time to dry and it was very rare that the floor paint went into service with any suspicion attached to its drying properties or to its condition at the time of releasing the car. A skin dried floor paint was practically an unheard of thing in the railway paint shop a quarter of a century ago, and it really ought to be so now. Floor paints ought to be so made, and given such an opportunity to dry, that they will act successfully in the nature of an insurance against the possibility of damage claims.

A lawyer friend says all cows killed by the railroads are valuable and, by the same token, a ten-dollar suit of ready made clothes smeared with an atom of floor paint immediately becomes a special suit costing fifty dollars. Hence the irritation created in the railroad claims department when the unlovely floor paint tenderly cleaves to the salt and pepper trousers or clings affectionately to madam's immaculate gown.

In a discussion some years ago at a convention of the Master Car and Locomotive Painters, it was held by a number of the speakers that the system which, for the most part, governed the painting of the car floor was more re-

sponsible than anything else for the trouble ensuing from the soft and inadequately dried paint.

When the carpenters are ordered from the car, at the beginning of the final hour of the day, and the painters proceed to paint the floor, with the carpenters returning early the following morning to complete their work of assembling the interior fixtures, you have every reason to expect a floor paint looking the worse for wear before it is released for actual service. Moreover, this same floor paint cannot, in the very nature of things, be guaranteed perfectly dry when the car is released the day following its application. To be trod upon, twelve or fourteen hours after application, by from half a dozen to five times that number of men, means that either the paint is dangerously quick drying or that it will be trampled out of all semblance of its original appearance.

In our estimation, the schedule for routing cars through the paint shop should be so arranged that the carpenters may complete their work at least sixty hours prior to the car's release. Immediately following the exit of the carpenters, the floor should be given its last coat of paint. With a good, strong drying paint, the floor, under this schedule, should have a finish practically as hard as adamant.

The question here arises, what is the ideal car floor paint? For one thing, it must dry quickly to an exceedingly hard surface. It should work smooth and free and fine under the brush and have gloss enough to bring out all the color contrasts which the interior affords.

Floor paints are usually furnished in paste form and require only thinning with some special oil—preferably a water proofing oil—which dries rapidly to a flint hard film. Formulas which provide one part paste to two parts special oil are now largely employed, and these give results about as near the ideal, under fair treatment, as we can hope to attain in this year of grace.

—1969—

Developing and Maintaining the Productive Capacity of the Railway Paint Shop.

Not an easy thing to do these days, you remark. However, as a rule, why not? The average railway paint shop need not, necessarily, be cluttered up with everything gathered from the four corners of the sea and land. When it ceases to be a paint shop, then by every right to which it is entitled it has no longer a place in the productive reckoning of the plant, and to charge the foreman painter with incompetency because of this fact is to lug in a far-fetched and bottomless accusation. We have said that the average paint shop need not be congested with a thousand and one things foreign to its makeup, and with an adequate assertion of the rights to which it is entitled we believe the average shop will be kept free from the overflow of all the other departments. There is, of course, a class of shops so constructed, with reference to the other shops of the plant, that a large amount of car and truck, and perhaps other classes of repairing must be done in the paint shop, so-called. Naturally, the productive capacity of such shops is subject to violent ups and downs, without exciting other than a surface examination on the part of the shop management, but even in this case the conditions are not at all serene and joyful. In those other cases where the imposing conditions have grown up to such an extent that the paint shop has become burdened with a helter-skelter of car, truck, machine, blacksmith and boiler making activities, with tinsmiths, steam fitters, air men and electricians to cap the climax, the productive capacity can be well imagined, and easily accounted for, but defended only on the ground that the paint shop has been allowed to become the football of the other departments. If this has developed through necessity, by reason of an overgrowth of equipment, as compared to size of shop and character of facilities, the defense is not difficult to support, but if the causes are outside of these things, then it is high time to "clean house." The railway paint shop ceases to be a paint shop only in name when it is used for purposes

other than for what it was originally made. Its productive capacity, when such a state of things exists, becomes a matter of speculation over which the foreman painter has no control. Painting, and painting only, should be performed in the paint shop. Diverting it to other uses is to shackle its original resources.

—1970—

Enforcement of Sanitary Provisions in the Railway Paint Shop.

Stringent rules should be established for the enforcement of such provisions. These rules may seem like a hardship to some, but in view of the results arising from the neglect to enforce rules looking to proper sanitation of the paint shop they are amply justified. We need not look up the data concerning painter's colic, lead poison and kindred ills to find an argument in favor of better sanitation for the paint shop. A long list of health failures could be cited due to lack of sanitation not alone existing in the railway paint shop, but prevailing in other shops wherein sanitary conditions are naturally more easy to create and maintain. Sinks where washing is carried on, even when good outlets are provided, get dirty and accumulate filth and sediment which is quickly converted into poisonous matter dangerous to the health of the workmen. The rule should be observed of cleaning these sinks at the close of every day. Charge the men working at these sinks with this duty, and see that they live up to it. This will eliminate one source of danger. The shop sewer basins are commonly another source of contamination, and a very dangerous source, too. Shop litter and the rapidly collecting dirt and filth drained into these basins quickly create a mass of decaying matter from which a variety of diseases develop. We have in mind a shop where the sewer basins are regularly cleaned, stated intervals being observed for this work. After every cleaning a standard disinfectant is applied, with the result that the sewer system in that particular shop is sanitary to about the fullest possible extent. A shop sewer system allowed to become choked up with floor filth, etc., to which the workmen are constantly exposed, contains possibilities for putting the human family under six feet of soil—altogether unpleasant to contemplate. In this matter an ironclad rule, lived up to to the letter, is the only saving practice. Over and above all rules of detail should be the strictly enforced general rule of cleanliness throughout the shop. The employment of good sweepers to take up the dirt as fast as it is made will take care of this matter and help to give sanitation a big boost.

—1971—

Personal Cleanliness and Painters' Ailments.

Some men are personally clean through preference; some men are so through compulsion. It is the latter class that, to a large extent, has conferred upon the railway paint shop the undesirable distinction of being infested with all manner of disease germs. The relations between personal cleanliness and good health are so intimate and necessary that any disregard of the former opens the way to all sorts and conditions of ill health. If there was the same strict enforcement of personal cleanliness in the railway paint shop that obtains, by virtue of public opinion or otherwise, in the house painters' trade, this time-honored charge of "disease breeder" written over against the railway car paint shop would promptly disappear. Now that we have put the lead poison issue under a process of elimination, it only remains to clean up shop and encourage—or to enforce, if necessary—strict personal cleanliness on the part of every inmate thereof. This should cover not mere cleanliness of raiment, but cleanliness of person—clean hands, dirt and filth removed from under finger nails before meals, mouth and teeth cleaned with the same frequency, face washed, beard kept well shaven, and a good sponge or plunge bath taken daily. The modern paint shop is not a dirty place, it will be conceded by all. As a matter of fact, the average railway paint shop with its corps of sweepers is an uncommonly clean place in which to hustle

for a living. It has usually good ventilating facilities, drainage equipment, and other arrangements whereby the comfort and safety of the workmen are provided for, and if the painter himself can be induced—or, if you please, made—to take the same care of his person and dress we shall speedily get this matter of good health versus disease reduced to such a basis that the health department, when looking for trouble, will have to look outside the paint shop to find it.

—1972—

Painting a Stationary Engine in Rich Bronze Green.

Any supply house can give or procure the necessary material, which consists of rough stuff for filling (the ordinary iron filler not being of the type to withstand high heat), also the coach color in rich bronze green, and the finishing varnish. The work should be done in the following manner:—After the body of the engine is well cleaned by brushing, if it be new, from sand, dirt, etc., or from oil and grease, if it has been in use, a coat of roughstuff made thin with turpentine should be applied and allowed to dry. If the surface is rather rough and requires filling, the paste roughstuff should be made thick enough to work like soft putty by adding whiting and should be drawn over the surface with a wide, flexible spatula, well smoothed down by dipping the spatula in turpentine frequently. When dry and hard smooth down with sandpaper or emery cloth. If not smooth enough apply another coat of roughstuff, thinned with turpentine, using a good bristle brush. If necessary give a second coat of this and then for a fine job rub with pumice and oil. Now give at least two coats of bronze green ground in japan, that you may obtain from any reputable paint manufacturer to save you the trouble of mixing it. Finish with at least two coats of clear engine finishing varnish.

—1973—

Refinishing Passenger Cars After Cleaning in Enamel.

An electric railway company some time since departed from its rule of finishing their passenger cars by the use of flat colors and varnish on the exterior of same, adopting exterior enamel instead. In following this method of refinishing the cars are shopped, scrubbed and permitted to stand twenty-four hours, when a coat of enamel is given. In this way the enamel is applied over a surface of color in japan with varnish over the latter, which practice has been in use for many years, the refinishing usually being done every eighteen months. The cars, after being enameled, remain in the shop from twenty-four to forty-eight hours and are then run out in the open yard, where the sun has a good opportunity to get in its work. We find that when the cars are in the yard a short time blisters appear here and there, wherever the sun strikes the surface of the enamel. Having been unsuccessful in determining the exact reason for the blistering, we had the firm supplying the material send their expert for examination. He advanced three different theories:—"First, the putty was at fault, but we proved that there were no blisters over the putty. Second, poor brushing out, which we also disproved. Third, moisture under the paint film, when cars are placed in yards and the sun drawing the moisture produced blisters." The cars are washed and enameled in close proximity to each other. The enamel works free, brushes out well, sets in five hours and apparently dries hard in ten hours.

It would not be fair for us to express a positive opinion as to the cause of blistering, but it seems to be a fact that no paint or varnish will ever blister, excepting from one of the following trouble makers:—

1. Green or wet lumber or other wet surface.
2. Paint or varnish in heavy consistency, not brushed out.
3. Paint or varnish applied over surface retaining alkaline matter from cleaning soaps or solutions.

4. Paint, varnish or enamel not hard throughout and exposed to direct sunlight.

We rather incline to the belief that the trouble as to forming blisters is due to No. 4 in your case, and while it may be argued that enamel paint is showing up well on steel cars, as well as the old wooden cars, the writer of this answer will say that when a well-tempered color in japan is used on the surface body of a car in several coats, there can be no possibility of the forming of blisters, excepting in the finishing varnish, and then only under certain conditions, such as undue haste in turning out the equipment, careless workmanship or inferior material. On the other hand, in refinishing cars with colored enamel paint, under the conditions named by you, it stands to reason that the pigment matter in the so-called enamel takes away so much from the life of the varnish that its wear is correspondingly less. While the system of using enamel instead of japan colors protected by varnish has many friends among master car and locomotive painters, they probably use it on steel cars entirely and have an arrangement by which they can bake each coat of paint, thus doing away with the risk of blistering. When enamel sets in five hours and dries in ten hours there is a suspicion that enamel is a surface drier, and if so, will solve the whole problem. Test it upon metal and well seasoned wood, well primed to satisfy.

—1974—

Paint Peeling from Passenger Coach.

Trouble with a passenger coach that was painted more than year. It is an old wooden car that has been burned off a number of times, so often that the surface of the wood has become calloused, the pores being entirely filled. The car was painted as follows:—It was burned off; thoroughly sanded; primed with a good primer; five coats roughstuff and rubbed; two coats body color, a little raw oil in the first coat of color; to the second coat a little rubbing varnish was added. The car was then lettered and striped and two coats wearing body varnish were given. The materials used came from two reliable and old established firms; one of them furnishing the varnish, while all the other materials were furnished by the other. Every coat of paint and varnish was given ample time to dry before applying another; the priming and roughstuff 48 hours, each paint coat 48 hours, and from 36 to 48 hours between coats of varnish. The car at time of writing was in the shop to be repainted. The surface was entirely perished, and the paint flaking or peeling off all over the car.

Our correspondent fails to say to what surface depth the peeling and flaking goes, but from the fact that he is of the opinion that the difficulty lies at the basic coat, we take it for granted that the coats are going right down to the wood, in which case it is fair to assume the trouble started with the priming coat, and its failure to amalgamate properly with the wood. Mention is not made of the brand of primer, whether shop mixed or purchased ready to use, nor of its specific composition, all of which are vital facts in connection with the trouble mentioned. However, we should not use an all oil and gum primer for a burned off wood surface, the pores and grain of which are choked up completely, as a rule, and offer a surface as negative as that of the steel coach. Such a primer lacks sufficient power for adequate penetration, with the result that pigment, if given time enough, will dry, but without to any appreciable extent uniting with the surface. The last state of such a foundation has been described by our correspondent, who says:—"The paint is flaking or peeling of not only here and there, but all over the car." The process used in painting the car appears to be a good one and, with one or two exceptions, conforms with that used on some of the trunk line systems of the Eastern country. Personally, we should prefer to use, speaking now of any one of the patent surfacing, ready-to-use materials, a primer for the burned off wooden surface consisting of equal parts of first coat and second coat material—in other words, one-half primer and one-half filler. For a surface choked up with old pigment we should add a gill of turpentine to each quart of the mixture, this latter medium serving to carry a sufficient percentage of the priming material into the old, stuffy surface, to give

it a foothold—to weld it, in fact, to the surface already referred to as negative in its receptive capacity. A drying period of 48 hours will give such a priming or first coat material ample time to harden fine and sure. Over this foundation build up a finish along the line indicated by our correspondent, and under ordinary conditions of service we believe it will prove immune to the surface disease here complained of.

M. C. H.

—1975—

Locomotive Finishing Black Paint.

The best finish for locomotives that has been used for a number of years by nearly all the railroad companies in the United States has been made from a high-grade carbon black, ground very fine in a varnish made from hard gum which was known as locomotive rubbing varnish to soft paste consistency, which was then reduced to brushing consistency with slow drying hard gum varnish (known as locomotive finishing varnish) applied like varnish over a ground of flat back paint. Although the cost of locomotive black enamel is rather high at this time, it would not pay you to mix it yourself, and we would advise you to purchase locomotive black or engine enamel from manufacturers, whose ads. you will find in the columns of *The Painters Magazine*.

AUTOMOBILE PAINTING.

—1976—

Top and Upholstery Treatment.

The interior of the top and the upholstery furnishings are a part of the car which comes within the province of the painter to look after before the vehicle leaves the shop. The vacuum cleaner here comes in handy; in fact, it is a fairly indispensable contrivance for the cleaning of the upholstery of a majority of cars. Instead of blowing or stirring the dirt around with a broom or a beating strap, the vacuum machine catches up the dirt and takes it away.

There are some cars, however, with the upholstery furnishings so delicate in texture that brushing with an ordinary whisk broom, or even sucking the dirt up with the vacuum cleaner, has a tendency to disturb or injure the soft, silken finish of the weave of the goods. In all such cases it will be necessary to use a soft point broom specially made for the work, or a brush of equally soft bristles.

All these features of the upholstery fittings will need to be studied carefully, and a treatment given suited to the texture of the fabric. Perhaps some of these furnishings will be found with stains and smears, and, while it is not strictly the painter's affair to take over this class of renovation, it will be appreciated by most car owners and paid for, if such splotches and blurs are removed. By saturating a piece of the same goods as the upholstery with ether, and rubbing the cloth smartly over the stain it will be removed in most cases.

If the strength of the ether needs to be reduced this may be done by the addition of alcohol. Ether mixes in all proportions with alcohol, either pure grain or denatured, but being inflammable and possessed of a heavy vapor, this mixing should be practiced with great care, as should the use of the mixture. However, this combination of mediums has the advantage of being harmless to the most delicate fabric, and so far as we know is unexcelled for the work here mentioned.

—1977—

Getting Color Too Heavy.

It is, for example, a perfectly easy matter to spoil the effects of practically all the primary coats and not a little of the surfacing of the roughstuff, etc., by being careless in applying the color coats. It is true, that much color is used too heavy in consistency, and when handled in this form no one is able to get the pigment on the surface smooth and in the condition of velvet, as color should be when flatted out over the surface. Color coats should go to the surface, if anything, in rather a thin condition, so that they will flow "easy like" and settle down smooth and soft to the touch when dry.

This is not to say that such coats should not be heavy enough to hold well and firmly together in particle formation and in texture. A former famous carriage painter always insisted upon using an extra coat of color, and in making the coats rather of the nature here described. Over this fine and silken color finish he also insisted upon flowing a varnish-color carrying for the first coat about three ounces of color to a pound of varnish. The next coat of varnish-color carried, for black or deep green, or blue, about one ounce of color to the pound of varnish.

For the lakes and some of the more transparent pigments this amount of color may rightly be considered an oversupply. For such pigments the ground color had best be brought up in a shape practically as fine as if it were the field color. The surface should be made as smooth and free from defect as possible—so free, in a word, that no after tinkering or mending must be indulged in. Then by making the color a close imitation of the final pigment, lacking the enrichment only of the lake, the glaze effect is almost certain to prove rich and lasting.

But through it all must run the thread of good brush work, of coats well laid and smoothed out and nipped at the surface edge in a manner to prevent sags and irregularities of every sort. If this method of using the brush is taken along through the various coats a good half of a most excellent finish is provided. Effective brush work is the real power behind the painter. There may be—is bound occasionally to be—some errors of judgment, some surface defects, some major or minor happenings to disturb the smooth progress of the finish, but if the brush work is of a superior quality it will cover a multitude of mishaps and bungling methods.

This work, it seems to the writer, should be made so far as possible of the best grade, and the painters, one and all, in every case should be taught to respect it and to excel in it.

—1978—

Wine Colors Effective.

Painters of a number of years of experience will remember the favor bestowed upon the wine colors some twenty years ago. While not as showy as many of the lake pigments, the wine color, in three shades, has a range of color possibilities of particular advantage to the car painter today. Carefully brought up, the surface will hold out the color famously, and it will have a depth and brilliancy surpassed by not a large list of other colors.

The wine color may be applied over a lampblack ground, first in the form of a flat color and then as a varnish color, using an ounce of the pigment to a pint of rubbing varnish. For a panel surface the next coat of rubbing varnish had best carry a wisp—say, one-half ounce—of the color for the purpose of maintaining the purity of the color. Wine color looks rich and dignified when striped in heavy lines of black and either split or edged with gold. In some cases the black may be edged with silver white lines, or the black line may be split with the white. Some of this rather plain striping effect gives the color an added glow, and, in addition, will serve to divert attention from any defects in the surface, although it may be said to the advantage of the wine color that it does not show defects to anywhere near the extent of most of the dark colors.

The wine colors are adapted to repainting jobs particularly; notably to those jobs which must be taken care of in an economical manner, with good results, both in point of appearance and durability, most desirable. In the case of old work, the surface, after washing and cleaning, should be sandpapered thoroughly with paper coarse enough to grind the old atoms and roughness closely down, and give the pigment a foothold into the old fabric. A coat of lead shaded with lampblack, and carrying one part raw linseed oil and three parts turpentine, should by right first be applied. Permit this coat to cure and harden perfectly before taking it in hand for further processes. Then examine it carefully, and with hard drying lead putty stop up all cavities, and by letting down this same putty with turpentine somewhat, it may be used to glaze and face up any existing coarse patches of surfaces.

The safe way with all wine and lake pigments is to get the surface repairs made before the color comes to the surface; it will be found exceedingly difficult to patch up any disfigurements after the color process is taken up. Indeed, this admonition applies to all colors; surface mending belongs below the color line. Cheaper and more durable work may thus be accomplished.

—1979—

Priming Coat Most Important.

The most important coat whether new or old work is the first or priming coat. If this is rightly adjusted and balanced up with a correct measure of elasticity, pigment and liquid medium, and is made fine enough in its particles to lay closely and compactly together, it will stick and prove durable and hold out the finish above it most amply.

This coat must have the capacity to hold fast to the surface, and also to hold all the other coats equally fast and secure. If it doesn't do this, flaking and peeling of the finish is sure to ensue. Naturally, the other coats must be graduated and balanced up in a manner to impart uniformity to the entire structural formation of the body of paint and varnish.

The question may here be asked: "What is the best primer?" Opinions differ as to the best all round primer. The paint maker will tell you that he makes the only primer fashioned as to the practical painter would have it to be, i. e., just the right amount of oil and pigment and the other necessary fixings to give it life and binding and wearing and surfacing properties, while not a few practical painters are equally sure that they, of all men, make the primer to give life to the paint, to hold both itself and all the other coats securely to the surface, meanwhile permitting the finish to stay at its full brilliancy to the full limit of wear.

It has been said that the oil and lead primer is no longer the material of superior excellence by reason of the fact that it is too slow; that the spirit of the times has taught men speed, and the demand is for a material quicker and sure, and even quite as durable, etc. This has the ear-marks of sincerity and good intentions, but it will scarcely measure four square to the facts.

Oil and finely ground white lead, despite the clamor to the contrary, if beaten out in some other pigment to quicken its drying properties and ground fine enough to meet requirements in the matter of rapid surfacing and a velvet finish, has a distinct superiority compared to all other pigments. It has density of fiber, a compactness of film and a surfacing quality possessed by no other material. Raw linseed oil and white lead well ground and otherwise refined, carefully united with, say, one part yellow ocher and three parts lampblack furnishes a first coat material which, when adjusted to meet the exactions of service and the limitations of time, comes nearer to the ideal primer and first coat material than anything the automobile painter has thus far been able to develop. We are now speaking strictly of shop prepared primers; the ready-to-use pigments for the purpose, procurable of many paint grinders, are, so far as the writer is aware, perfectly reliable, and doubtless economical. In the repainting business, however, they are not always adaptable to the varied requirements of every day practice.

—1980—

Care in Rubbing Roughstuff.

In rubbing the roughstuff exceptional care will be required because the panels are large and defects which might pass unobserved on the small surface are almost unduly emphasized on these large ones. It is a good plan to use rubbing bricks in size as large as may be handled conveniently. It is better to get the rubbing surface of the stone as large as possible, and get the thickness of stone down to where it may be handled comfortably and to the best advantage. Use the small faced stone only on those spaces where it is not possible to use the big stones. Use plenty of water in rubbing and thereby prevent the development of a gummy condition between the rubbing stone and the surface; plenty of water will also keep the surface washed free of small particles which might scratch the work, or even cut furrows in it which no amount of varnish or other stock may conceal. And in this matter of varnish being used to conceal defects in the surface, it is a mistake to suppose that varnish is a successful medium for the work.

Varnish will exaggerate surface defects, but rarely obliterate them. On these great fields of pigment it will be of logical advantage to run the stone one way only; this will obviate criss-crossing and circular motions of the stone, all of which tend to musing up the surface with positive streaks and marks which are prone to show under the finish.

In rubbing the moldings a stone should be shaped to suit the crown of the moldings and lap over nearly, if not quite, to the flat surface. Some surfacers prefer a piece of sandpaper for the moldings, but as a matter of fact, you can no more rub the moldings with sandpaper than you can perform the same

office for the flat surface. It is true you may sandpaper the half round surface until it looks smooth, and indeed is smooth, but it lacks that regularity of effect that a rubbed surface has, and in the case of a first-class job the ill-worked down molding may prove the means of cheapening the entire effect.

As a rule it is best to first rub the outer surface or edge of the panel; the inner portion of the surface cannot very well be missed, and, if anything, it receives more attention than the outer rim of the panel. Usually for these big surfaces six or more coats of roughstuff should be applied in order to get a sufficient depth of pigment to enable the workman to face the surface down to a level condition and absolutely devoid of hills or hollows. It is important that, so far as possible, the surface be rubbed to a smooth condition, but it is primarily essential that, above everything else, it be reduced to a perfectly level condition. That is indispensable.

The surface having been rubbed carefully and in good shape the next move is to lightly sandpaper it with 00 sandpaper to flick off the particles of substances which might otherwise interfere with the development of a first-class finish. Then proceed to apply one, and possibly two coats of color, this practice to be followed by the flowing on of a coat of varnish-color, letting this material go freely to the surface as a means of developing a rich, fine body of material to surface upon and to bring out the finish in fullest measure.

Another coat of rubbing varnish, this to be partially varnish-color, should now go to the surface. Perhaps an ounce of color to a pound of varnish will suffice to maintain the purity of the color field, and for the next coat it will be well to get about this same amount of color into the varnish pound for pound. On this coat, if all goes well, after rubbing the varnish down carefully, the striping and lettering, if any, may be applied. Then, in due time, a final and clear coat of rubbing varnish will be in order, after which, with the proper amount of surfacing and washing up, etc., the surface may be cleaned and dusted and finished with an elastic varnish of approved quality. It may, of course, be necessary to apply two or three coats of rubbing varnish in excess of those here mentioned, in the case of some surfaces due either to the imperfect condition of the surface through inattention to certain vital details, or to the fact that an exceedingly fine finish is called for. The running parts of the truck are generally in need of no small amount of cleaning and conditioning preparatory to painting and finishing, but this work should have the very best attention.

—1981—

Color Selection.

Right in line with this matter of colors, having varnish as their predominating ingredient, comes the subject of color selection. To many painters in the jobbing shop, this selection of color for the car is one of their annoying tasks. There are a few simple rules, which obtain in selecting a color for the car, which are likely to help the average man. The color, in the first place, should be chosen to suit the lines and general conformation of the vehicle; then, too, its size must be reckoned with, because some colors have the property of unduly enlarging the size or appearance of the car, while others have a diminishing effect. All these matters had best be taken into account before deciding upon the color scheme.

For the large car, whose appearance the owner is desirous to have minimized to a reasonable extent at least, solid black, or any of the deep, brilliant greens or blues, are especially adapted. These colors not only have a diminishing effect, but they are largely neutral in respect to seasonal effects upon the senses. Light colors—at least many of them—have the capacity of enlarging the appearance of the car, and, under the effect of some of them, the big car looks bigger. The two color scheme appears to excellent advantage upon the car, for example, which has numerous broken lines, moldings, and varying outline sweeps.

The writer is inclined to believe that if this color selection work were more carefully performed, a big improvement in the appearance of the car equipment

would be soon noticeable. Moreover, it might have the effect of encouraging the use of finer and more suitable colors, with more frequent varnishing, in order to keep them amply protected. This would fetch to the shop an increased volume of business, and possibly distribute it through the season in a way to make the year a busy one throughout.

—1982—

Value of Striping.

Then we have striping effects for the car as a subject worth while. Most repainted cars, candidly speaking, are greatly improved by some striping effects, even the simple ones doing much for the finish. Today, the striping of the car, as a rule, is confined to comparatively few lines, and none of these to be classed as fancy. Usually the straight line work is in evidence, and for the surface that remains in good condition this simplified display of effects meets the requirements fully.

Upon the old car, disfigured and battle scarred beyond the resources of putty and paint of the most deceptive character to make good, striping is almost like manna in the wilderness. It diverts the eye and detracts attention from the defects to the lines and effects of color quite completely. Upon such work it saves varnish and surfacing processes, which at this time are a source of important expense.

Single and double lines of contrasting color, or of two or more colors, have a wonderful capacity for alleviating surface defects and disfigurements; they are comparatively cheap to apply, and help to pass along a surface which, without the striping, might be protested at sight. Upon black or deep green or blue, gold, carmine, white, ivory white, orange, light blue and green lines, both double and single, may be used to splendid advantage, and for the relief work above mentioned they are specially recommended.

All these colors should be purchased in tubes, which will enable the purchaser to carry them in workable shape for a long time. Striping may well be resorted to upon surfaces which plain painting and finishing will not suffice to make presentable at the price usually paid for repainting work. It helps keep the cost down and at the same time furnishes an appearance of attractive results satisfying to the car owner.

In handling these old surfaces, in a manner to make the finish presentable at a comparatively small cost, not only the striping judiciously applied helps immensely, but the choice of colors, already spoken of, will also aid to conceal surface defects. In all cases, where it is desired to keep down the cost of the paint and varnish repairs, the selection of color must be chosen with chief regard for the capacity of the pigment to alone and unaided conceal the defects of the surface.

The dark colors, such as black and green and blue of the darker sorts, and the deep maroon and lakes, show surface defects much plainer than yellow, brown, light greens and blues, many of the lighter reds, and practically all the gray colors. For the finest work the black and deep greens and blues are unsurpassed for tone and brilliancy and luxurious effects; the other colors have the redeeming quality of adaptability to all surfaces; they are all the year round colors; they show defects in the surface to the minimum degree, and are, therefore, specially suited to cheap work, or to work that may be rightly called good yet lacking the refinement commonly associated with the best class of work.

—1983—

Dusting.

In the dusting of the surface for the varnishing the first work should be done with a large oval duster; then take a flat duster of a width suitable to the size of the surface and go over the work carefully, and then, with the same tool, as a final operation flick a bit of moist varnish upon the tips of the bristles,

after which work the duster lightly over the surface, taking up in this process any light, flocculent matter sticking to the old varnish coat. These old foundations have a certain amount of magnetic attraction for the lighter forms of dust, and this manner of picking it up proves very effective, as a rule.

Some finishers, markedly those of the old school, adhere to the practice, after the final dusting, of wiping the surface rather lightly with a piece of silk previously soaked in raw linseed oil and then wrung very dry. This the writer has used successfully in varnish room work for a considerable length of time, later adopting the brush method, with the tips of the bristles varnish-moistened, which is quite as effective and quicker.

—1984—

Selling Service.

The business of painting automobiles—vehicles of any kind, in fact—depends for a successful outcome upon a number of important factors. One of these is salesmanship—the ability to sell painting and varnishing. It is not enough, these days, to simply get the car or carriage to paint and then turn it out a finely finished product. The owner of the vehicle is often ignorant of some of the important things which pertain to the upkeep and the care taking of the work. Who is in a better position to give the desired information than the painter? Here is where the salesmanship element comes in.

The good salesman anticipates the attitude of mind of the car or carriage owner and, as he releases the vehicle, at once proceeds to explain the means which should be used to best maintain the work in the finest possible condition for the maximum period. Finding the needs, he at once undertakes to meet them through personal service. He is interested in learning what the vehicle owner thinks of the finished product, and what value said owner gets out of it. He knows that, if the owner is satisfied, he will come back for more work, and probably bring other vehicle owners with him.

This modern paint shop salesman knows that the good will of the vehicle owner is the very best sort of advertising. It is really a fine thing to sell your own personal service, while selling paint shop products—giving personal worth along with splendid workmanship—for eventually, if not even as the present days go by, this personal interest and service is to pay splendidly in all the things which help to create and make a business prosperous.

The satisfied customer is the best advertisement. The painting business of today is built on reputation, and this is made out of honest dealing and service rendered. To raise the quality of the work performed to the highest notch, and keep it there, and to assist the vehicle owner to produce, from that work, the maximum durability and satisfaction, is an attainment which craft, skill, honest dealing, and salesmanship, which include selling personal service, is making every day apparent, and every day returning a high rate of interest on the investment.

—1985—

The Business Side of Auto Painting.

While the promise of the automobile painting business becoming an enormous industry is good, in that it is estimated that there are now in use some 2,000,000 cars, with perhaps nearly another 1,000,000 to be added this year, and with the further assurance that the cars are being now made sufficiently durable and strong to warrant the owners having them repainted before disposing of them, it is of a character to move the painter to exercise the utmost economy and the most careful methods in handling all work.

It is a day for looking after the small things no less than the large ones. These embrace the buying of stocks and tools, management of men, shop practices, business methods, bookkeeping, and the hundred and one things, big and little, which need the attention of the shop owner. There is also included the

advertising and salesmanship ends of the business. In the writer's opinion these two features should be aggressively taken hold of, and made to bring customers from far and near.

The good roads, now quite common in many States, make this canvassing for business at distant points, and the bringing of work from those points, a comparatively easy matter. In the old days there were certain distinct limitations defining the painter's field of business getting, but at the present time an entire country is none too large a territory from which to fetch the cars for repainting and, in some cases which have recently been brought to our attention, at least two counties have been made to pay tribute to the aggressive force of the salesmanship and advertising ability of the painter.

One manager of a painting business has lately taken up the practice of making a canvass, so far as possible, of all the cars owned in his county, and by procuring the names of the owners through directories, registered license owners, etc., he is able to carry on all the year canvass for painting business. This he does through the columns of the leading newspapers of the country, changing "copy" often enough to keep the readers alert for the new announcements, and also through leaflets, postal cards, booklets, etc.

—1986—

Personal Canvassing.

Personal canvassing is likewise done at convenient times and seasons; here the salesmanship element counts for a great deal. Propositions which appeal to the owners need at these interviews to be put forth for consideration; they may not bear fruit immediately, but like bread cast upon the water they may return after a few days to the profit and advantage of the shop owner.

—1987—

Removing Polishes Used by Owners.

The problem of divesting the surface of the polish used by car owners preparatory to painting and varnishing is giving all hands in the paint shop plenty to do. This pasty, adhesive mixture, composed of wax and other elements, when used upon the finish having surface fissures of any appreciable depth, gets fast into the crevices and holds like grim death. It is said that this surface condition is productive for more work going wrong than any other known medium. At any rate, there is much trouble being made for the painter through the use of these polishes, and it is real man's job to make the surface that has been fed upon this class of renovators fit for paint.

Recently the practice of washing the surface with gasoline, then with turpentine, and then rubbing with pulverized pumice stone and turpentine, following with a light rub with the pumice stone flour and water, has been found to work very well indeed. The gasoline is an exceedingly searching fluid, and the turpentine licks up the foreign substances which escape the gasoline, and these two mediums, acting with the pumice stone flour, clean out the cracks, throttle the acids and gas formations, and clear up the surface for any process which may come after.

—1988—

The Touch-up-and-Varnish Job.

The jobbing shop painter must be prepared to handle all classes of repainting, including the troublesome touch-up-and-varnish job. This class of work is chiefly objectionable because of the matching of the color, touching up, etc. The chemical light and heat of the sun, acting upon colors, neutralizes them, and this effect is commonly called fading. Some deepen and become darker, while others get lighter, and in either case the effect is due to the influence of the sun.

The primary colors are neutralized, if so desired, by mixing them so that no single one of the colors is distinguishable in the mixture. Also, if so desired, one of the primaries may be made to predominate, in a way to resemble a faded example of the color. The primaries are red, of the carmine hue, Prussian blue and lemon yellow. It will be found, also, that all faded colors must have some certain amount of the primaries to match them.

All dark colors, even including black, may be touched up with some combination of the primaries. Black, under successive coats of varnish, becomes oxidized or is given a green hue. For the touching up of black, that has faded, use the three primaries along with black. The blue and yellow will make the green; then for the proper shade add black gradually. Next neutralize the mixture by adding red until the correct shade is reached.

One of the reasons why the work of matching the color proves, for the most part, difficult to perform, is that the work must be accomplished with one coat of the pigment. This must, therefore, be done with color a little heavier, at least, than ordinary color and it should be made to dry out to about the same luster as that of the old paint and varnish fabric. This latter is generally a rubbed surface.

The thin, flat color, as a rule, floats up a false tint or shade before it sets, and generally this tint or shade is darker than the expected shade. The common vermilion surface can be touched up, even when faded badly, with a mixture consisting of the basic color united with the primaries. In the case of a yellow surface, faded and worn, mix white and yellow together, and then tone the color with Prussian blue and red, the remaining primaries.

A carmine that has faded may be matched in this way:—Take some carmine, blue and yellow, in semi-paste form, and try the carmine comparatively to see how badly the color has faded, and then match the faded parts with the blue and yellow, using the carmine as the basic material. For a lake, which almost invariably turns dark with age, add coach black to deep the match color.

Bottle green, olive green or Brewster green can be matched by taking coach black for the base and then work to the shade or tint desired with the three primaries. In the case of light green omit the black.

The workmen who may be charged with the duty of matching the color should know, almost at a glance, the nature and character of the original color. The rule is to take the original pigment represented by the faded surface for the base, and then with the primaries catch the shade or tint. Thus, as in the case of the carmine, however badly it may be faded, the fresh carmine color will need to be used as the base, with the other two primaries to be added in order to catch the correct shade.

The above was, years ago, termed the scientific method of matching colors by no less an authority than J. G. Cameron, whom the writer is able to vouch for as an able workman and thinker. In touching up use no white lead unless there is some in the original color.

In the world of colors there are today many new and startling reds, to match which the workman will need to quite fully know their character, controlling ingredient, and be able to identify them. However, in this work of touching-up-and-varnishing, the reader is invited to try the plan here outlined; we believe it will enable him to greatly simplify and render more accurate the matching of colors, which is easily the most difficult part of the work. It is in order here to say that, even though the match color is known to be very close in shade and tint to the old field color—an exact match, let us admit—the touching up should be limited to the actual requirements, and to the exact size of the defect, with the color used almost in the nature of varnish-color as a means of preventing it from drying away from the faded spots.

The power for reflection of light as shown in a varnish-color aids to keep it, when drying, from absorbing an excessive amount of light. When the color does this it always dries to a shade or tint different from that of the old color, with the result that the spots of the leopard are imitated. The match color should in every case reflect more light than it absorbs, even when perfectly matched.

In touching up it is a wise practice to use a lettering pencil and to thus be

able to get the spot correctly touched—that is, coated in to exact dimensions, and with no thick, blurry edges to stand out like a sore thumb after the varnish has been applied.

Some years ago it was the plan of a painter known to the writer to take some of the color used on each individual job, put it in a small bottle, label it properly, and expose it to the rays of the sun, at the date of the release of the job for service. When the job came back for varnishing, touching-up, etc., the exposed color in the bottle was taken in hand for the match color and, while this color often had to be tricked out some with additional color and matched to meet the fading and discoloring acts of the old field color, it not infrequently served the purpose fully, before dusting, and as a final cleaning, a soft wool sponge was moistened with water lightly, after which a few drops of sweet oil were rubbed over the sponge. The surface was gone over with this, and at once followed with a piece of silk—an old piece carefully washed to be selected—with which it was wiped until dry. Then with an absolutely clean, white bristle duster, flat form, the work was brought right out free of foreign matter and ready for the varnish.

—1989—

Painting, Striping and Finishing the Automobile.

The automobile painter in the small town has, in common with his brother in the larger communities, noted during the season a large number of yellow cars in use, with apparently few restrictions as to variety, a wide latitude being observed in this respect. Perhaps it would be well to analyze some of these most largely used yellows. Coffee yellow, for example, is a color that is just now, at any rate, found to be quite a predominating color in both town and city. To the layman this color at first glance may look like a coffee shade, and, in fact, it is nearer this than anything else, although it is listed as coffee yellow, which, technically considered, it is. It is produced by mixing flake, artic, silver, Florence or any of the other finely prepared japan ground whites, with enough Naples yellow to produce, after adding a few drops of asphaltum to give the mixture proper tone, that peculiar rich coffee shade of yellow which has won for the color the large following it now enjoys. For the smaller class of cars especially it brings out an attractive field of color. This is enhanced by striping the color in lines of aluminum, ivory black, dust-proof gray or arctic white. To properly develop the color bring the surface along in the usual way, making all the under coats fine and good. Leave no defects in the surface to mend up and put out of sight after the final coat or coats of color are in place, such work being exceedingly difficult to do upon a color made up of the ingredients composing coffee yellow.

Indeed this is a correct practice in handling all colors, sensitive or otherwise, because at best the repairs made upon the field color are out of place and cannot be surfaced down in connection with the main body of the surface to which they belong. Having established the color solidly on the surface, proceed to bring out the depth of color effects by using two or three coats of varnish color, as the condition of the surface or the quality of the work may indicate. Aim so far as possible to preserve the purity of the color, for which purpose it will be advisable to use some of the color in all but the last coat of rubbing varnish.

Orange chrome yellow, common as this color everywhere appears to be, looks surprisingly attractive flaunted from the sweeping breadth of a big touring car, and this seems to be a plausible reason for its present popularity. It is an easy color to produce, at any rate. Simply bring the surface up, as in the case of any solid color, and apply the yellow, first as a flat color and then as a varnish color, holding some of the color in the varnish up to the last but one of the rubbing varnish coats. Lines of aluminum, deep, rich reds or lines of gold or fine lines of pale blue set out orange chrome yellow fields about as nicely as any colors that may be used.

Cream and straw colored automobiles are likewise much in evidence in

some parts of the country, especially in the larger towns and cities. These are rather cool and comfortable-looking colors, with a certain delicacy about them that appeals strongly to the car owner who wishes to get away from the conventional black or blue or maroon.

Cream color, if not bought ready to use, can be made of the following ingredients, approximately:—Flake white, five parts; English vermilion, one part; chrome yellow, two parts.

Straw Color:—Lemon, two parts; flake white, six parts; adding to this mixture a couple of drops of vermilion.

In addition to these are also to be seen canary yellow, primrose yellow, sulphur yellow and even maroon yellow, that almost indefinable carmine-yellow effect that has a certain charm for anyone seeking a novelty in color. These colors are, so far as the writer is aware, all obtainable ready for use, but in the event of shop mixing them the following proportions may prove useful:—

Canary Yellow:—Lemon chrome, two parts; flake white, seven parts.

Primrose Yellow:—Flake white, thirty parts; chrome green, one part; lemon yellow, fifteen parts.

Sulphur Yellow:—Flake white and lemon chrome, equal parts.

Maroon Yellow:—Chrome yellow, three parts; No. 40 carmine, five parts.

With the exception of maroon yellow these colors are all solid covering pigments, and what will serve for those already described will in like manner do for these. While for the most part striping effects brought out in deep red, aluminum, black and gold furnish the most satisfying effects, some departure from these may correctly enough be taken. For example, a three-eighth-inch line of gold, edged with a fine line of cobalt blue cast correctly on a field of straw or cream color, gives a remarkably pleasing effect. So other little variations may be taken in connection with these delicate-toned yellows to add to their good looks without violating the laws of harmony and contrast.

When brought up from a new surface practically all of these yellow colors should be started on a field of pure white. Two or three coats of white will serve to furnish a ground solid enough to hold out the yellow in any of the hues here noted. All these colors evince a tendency to darken as they wear and lose some of their original purity. The pure white base acts in the nature of a corrective of this weakness, and it is said to do this by reason of the fact that it offers a neutral rather than a positive base. In other words, it neutralizes the discoloring effect of the yellow through its own lighter body and the counteracting effect thereof.

In the use of the yellow pigments there is this to be said as an explanation which the inexperienced may well bear in mind, namely, clean processes are necessary from start to finish. The surface must be kept clean at all times and under all circumstances. To accomplish this, clean tools, clean colors and clean materials and a clean person are essential. In this respect and to this extent these colors cost a little more to apply than some of the darker colors, which are but little, if any, affected by the ordinary processes, which would practically ruin these delicate pigments. They are cooler looking colors in summer and quite as warm looking colors in winter, compared to the darker colors which the world of fashion has so long worshipped. They offer the painter in the small town and village an opportunity to get away from the conventional shades, tones and tints without departing from what the automobile using public regard as quite the proper thing.

In this connection there are some other colors closely related to these yellows which are more or less used at the present time and promise to be used for some time to come. One of these is copper color, which is made of chrome yellow two parts, English vermilion one part, coach black one part. This color, with its peculiar coppery tinge and with its sheen in the morning sun, when properly applied to, the surface offers something good to look at. After building up a proper ground and matching it as closely as possible to the true copper color, apply a coat of the copper made to dry flat. Follow this with varnish color, using for the first coat three ounces of color in one pound of varnish, first thinning the color partly with turpentine. When dry reduce the

gloss by rubbing with a soft wool sponge moistened and dipped in pumice stone flour. Then apply second coat of color varnish, using two ounces of color to a pound of varnish, rubbing varnish being intended in both cases. In due time give this coat a light rubbing with water and pumice stone flour. For the third coat—speaking now of the best grade of work—use a half-ounce of the color in one pound of varnish, as above, and flow on freely as in the case of clear varnish. Rub as above directed, stripe and ornament and then apply a coat of pale rubbing varnish. This coat in proper time will only need a moderate rubbing and should then be finished with a very pale elastic finishing varnish. In the event of finishing with one less coat of material omit the last coat of varnish color mentioned. The finish will still be very good, but probably lack somewhat in depth of coppery effect and brilliancy of sheen. Striping effects in aluminum, gold and black, ivory white, pure white, and in No. 40 carmine, edged with ivory black, furnish fine contrasts and serve well when brought out to show off a car amazingly well.

Another color that has evoked some applause from car owners is chamois. This is made of raw sienna, three parts; lemon chrome, one part; flake white, six parts. Perhaps you can buy this color ready for use, and if so it will be found the most convenient plan and quite as cheap as shop mixing it. It is really a very attractive color, and when the precise color of the chamois skin is produced with appropriate striping effects, the whole gownned with a superb finish, the car displaying it is sure to attract immediate attention. For striping effects Indian or Tuscan red, vermilion, aluminum, gold edged with black or with No. 40 carmine show handsomely.

Develop this color from a blank white ground, same as the yellows already described, observing all the extra attentions recommended for such colors, and depend on the varnish color to bring out the effects characteristic of the color when rightly produced. Here, however, a word as to the importance of the varnish color consistency. The tendency is to use too much color in proportion to the amount of varnish. Always the greatest brilliancy is attained with a limited quantity of color, and when this color field is built up solidly before commencing the use of the varnish color coats there is no possible use of having the material carry an excess of color. This is true of the pale yellows, practically to the same extent that it is true of the so-called transparent coats, such as, for example, carmine, lakes, ultramarine, etc. The final coat of chamois skin color need contain not to exceed one-half or three quarters of an ounce of color to a pint or a pound of varnish. This will be ample to furnish requisite strength of color and it will much better serve to fetch out the brilliancy of effects which the car users have a right to expect. In finishing over this color the palest varnish it is possible to secure should be used, preferably water white varnish.

As a sort of contrast to the coffee yellow above described coffee brown as a color for some of the heavier class of cars is now attracting a good deal of attention. If not obtained ready for use mix as follows:—Yellow chrome, two parts; burnt sienna, one part; burnt umber, five parts. These are approximate measurements, the varying strength of pigments as put out by different manufacturers naturally making them so. Take a kernel of well-roasted coffee, and with it as a sample a fairly good colorist will be able to work close up to the color. This brown is about the most effective of all the browns of the deeper shade and it has a richness that many of them do not have. It is, moreover, a perfectly solid covering pigment, and any ground that will do for other solid colors will do for this. A couple of coats of varnish color will produce the required luster and depth of effect. Gold and black lines, ivory white and shades of brown, either lighter or darker than the field color, yield taking effects. When a customer comes in to discuss browns for his car don't fail to call his attention to this color. Neither need you be ashamed to mention chestnut brown to him, for it is a fine color and a most durable one. To make it, use one part of ivory black, two parts of chrome yellow and two parts of English vermilion. It is a solid color, and with the same attention given other browns it will do perfectly well. Stripe the same as recommended for coffee brown. The somewhat famous twentieth century brown which Fifth avenue has admired for a season or two is

made of burnt umber toned with a little vermilion and ivory black. It is a deep rich brown and looks at its best striped in lines of gold and black or ivory white, the white lines being drawn fine.

Like the yellows, the browns wear durably; and while wearing they show pleasing color effects without showing dust or dirt or road accumulations. They are neutral colors as respects the season, being neither hot nor cold. Colors, too, that are easy to clean, as colors go, so that taking the two families on the whole they have substantial advantages to recommend them.

—1990—

The Motor Truck—Some of the Essential Details of Painting and Finishing.

Problems arise in the painting of new trucks and in the repainting of old ones, which have nothing in common with those met with in painting other classes of equipment. What the truck owner expects, and what he has every right to expect, is a strong measure of durability on the part of the paint and varnish structure. Additionally, for the most part, he expects the painting to carry sufficient advertising and ornamental features to make the truck equipment pay him a certain profit over and above that derived as a mere machine for lugging about the trappings of commerce.

To understand that the motor truck is neither a thing of beauty nor endowed with life everlasting, one has only to observe this class of equipment in service up and down the thoroughfare of any large town or city. What the painter and the truck owner are chiefly concerned with, beyond the advertising possibilities of the vehicle, and the durability which may be established in the successive paint and varnish coatings, is a general attractiveness for the truck. It is within the scope of the painter's skill to apply a color scheme and a finish to the truck which will soften down its angular lines and erase to a very great extent the rigid curves and obstinate corners.

Meanwhile it is well to bear in mind that the graces of fashion supposed to pervade every outward show of the pleasure carriage or automobile are not looked for in the motor truck, operated with a view of daily securing certain definite performances.

What the painter, then, finds it necessary to do consists principally in applying a style and kind of painting and finishing which will well serve the advertising requirements of the owner and at the same time afford the truck the fullest measure of protection from the elements. The service to which the truck is constantly exposed is of an unusually severe sort. Oscillation, vibration, surface strains, road conditions at certain seasons of the year running into all degrees of badness, destructive weather elements, etc., are among the enemies which ambitiously burrow into the vitals of the paint and varnish.

To overcome these things so far as possible an elastic priming coat is first necessary. The truck is made up of wood and metal which require a primer of distinct composition. Metal, of course, is lacking in the power for absorption which distinguishes wood, because of which quality the former can take care of only a corresponding smaller quantity of oil.

Probably from 25 to 35 per cent. less raw linseed oil than that used in connection with wood will suffice to give for the metal about the same ratio of elasticity usually provided for the wood. In the case of wood, we have a considerable proportion of the applied oil body taken into the cells and pores, whereas on the metal the oil medium must dry and harden through direct exposure to the air.

What the best primer for the wood and metal constructed truck should be composed of, in addition to the linseed oil constituent, is a matter for an honest difference of opinion. The shop mixed primer, as used by a large class of painters, is made up of raw linseed oil floated in various pigments, such as white lead and lampblack, iron oxides, graphite, and so on.

In the class of primers obtained in the open market, in a ready-to-use state, strictly reliable products for both wood and metal are at the command of the painter. The main thing, in all three materials, is a measure of elasticity graduated to meet the character of the surface to which they are applied. In preparation for such mediums the surface of the truck demands the most thorough cleaning methods possible. An experienced automobile painter lately put the work in this way:—"Cleaning the car is child's play compared to cleaning the motor truck." Doubting the statement, examine, as opportunity offers, an Alco, a Garfield, Federal, Knox, Peerless, Mais, Mogul, Reliance, Lozier or a Packard, not to mention many others equally formidable.

This class of work constitutes a hard and laborious feature of the truck-painting business, and the charge for it should be made ample to cover it fully. Two parts of crude oil and one part turpentine, or turpentine substitute, finishing off with turpentine, will help to rid the surface of the grease and oil accumulations. Sharp scraping knives, putty and mowing machine knives, and even the hooked steel scraper, will be needed in the work. There will also be parts requiring the application of sal soda or lye solutions. Strips of the coarser burlap fabrics furnish excellent wiping textures for the truck chassis and under parts.

In the case of trucks to be repainted the importance of the first coat remains a first consideration. A diminished supply of raw linseed oil, with an increased amount of pigment, but always with a proper balance of oil, must be provided. But whether the work be new or old, the one law holds true, namely, thorough and complete drying of the first coat. Moreover, the application of this primer or first coat should be of the very best—on the basis, in fact, of John Dewar's "twenty-five per cent. material and seventy-five per cent. man."

Having the primer or first coat material in place, and cured and dried out right, the second coat is in order. For either new or old work, enough pigment, if shop mixed, can be added to the first coat stock to reduce the quantity of oil, when the entire mass is thinned with turpentine, to one-half the original amount, and this resulting mixture will serve as a second coat preparation. The ready-to-use second coat material may be expected to contain, and if from a trustworthy maker will contain, the proper balance of ingredients. Upon this second or filling coat, when dry, putty all cavities and other surface defects with a hard drying putty. Then over this putty, for the larger surfaces, apply from two to four coats of roughstuff, as the quality of the surface demands, rubbing this filler down smooth and level with artificial rubbing stone and water. Upon many of these trucks, especially stake and slat type bodies, there will be parts which may be built up with a coat or two of sandpapering material put on over the second coat stock. In these coats fetch the proportion of oil down to a ratio of one part oil and five or six parts turpentine. Sandpaper this foundation down very carefully, and avoid sharp surface edges and parts which, by reason of conformation, carry a minimum depth of pigment.

With the surface above the chassis rubbed and sandpapered and made fit, apply one coat of flat colors, then one full varnish-color coat then a reduced varnish-color coat—that is, a reduced quantity of pigment as compared to the original volume of varnish—and after lightly rubbing this last coat with pumice stone and water, ornament, stripe and letter. Lay on a coat of clear rubbing varnish over these decorative effects, and in due time rub out with pumice stone flour and water, taking care to keep off the sharp edges and curves. For the truck body, as for the chassis a sure drying, non-spotting, soap, mud and gas resisting varnish is necessary. Fortunately, the advertising columns of *The Magazine* direct attention to the makers of such varnish.

Trucks with built up wood or metal panelled tops will require a building up process a little more extensive. Two or three primary surfacing coats will be needed, these to be followed by from four to seven coats of roughstuff; the character of the woodwork, and the wood surfacing processes, in the case of new trucks, determining this. One coat of color, two coats of varnish-color, and two coats of rubbing varnish, on both old and new jobs, for good work, will be needed to hold out the finishing varnish. Semi-transparent blues, and all the lake colors

will require, naturally, a preparation coat, and perhaps two, in addition to the coats above noted.

All the thorough-going methods here advised for the truck body, of whatever type or style, will be needed for the chassis and underparts. Two or three good coats of surface, with one coat, at least, of color, a couple of varnish-color coats, one coat of clear, rubbing varnish and one coat of finishing varnish, are practically the minimum operations for good work.

The painter for this year need have no fear of any restrictions in the range of colors. The greens, blues, reds, maroons, lakes, browns, yellows, grays and a multiplicity of intermediate pigments, with decorative effects to set them forth into public view, are all in order. Give them all a good foundation and the ample protection of fine varnish coats, and the problem of durable truck painting will be solved.

—1991—

Advice to Car Owners.

Much that is harmful is spread abroad by people making a bold show of knowledge concerning the car upkeep, and some of this misinformation has to do with the painting. For example, not long since, there appeared in a certain automobile publication some directions anent painting a car, in answer to a question from a "reader." One paragraph was to the effect that the best way to paint over an old foundation of paint is to use a dull colored paint, rub it down and finish with varnish. Just what the writer had in mind it would be difficult to surmise, but at any rate, a paint that is first rubbed down is hardly in a condition to be immediately varnished over. A delicate color, such as is almost exclusively used at the present time, would be a sorry looking pigment after having been rubbed in preparation for the varnish coats. Especially would this be true if the work were in the hands of an amateur. The above class of information is responsible for a good deal of the almost disgraceful looking paint and varnish work that is to be seen on many town and village cars.

The painting of the automobile equipment by the owners thereof may well be discouraged, apart from the financial considerations involved. In the first place, the painting of the car or carriage is a class of work that requires highly skillful processes—comes, in fact, within the range of art work—and under no set of rules that we are apprised of can the untrained hand show sufficient cunning to do the things which the practical mechanic finds difficulty in doing. As in carriage painting, so now in car painting, the paint manufacturer in some quarters is coming forward with a ready-mixed color that at one and the same time and with one coat will enable the owner to slick his car over in a manner to deceive the very elect. And here is the pathetic part of the situation:—All such work is a gross counterfeit, and in the end, if the car lasts long enough, it will cost the owner more to have the work made right than it would to have had it properly attended to at the outset. Meanwhile the car by its bungled and misshapen appearance and by its smeary and smutty surface is an object of ridicule and offense. Moreover, all such painted cars fail to give the service they naturally are capable of, because to a far greater extent than is generally conceded the paint and varnish measures the durability and life of the car. Here, then, is a fundamental reason for registering a protest against the practice of car painting by the car owner.

In all this free advice to the car and carriage owner and user, the need of simple terms and spoken language that will convey direct information in a manner understood by the layman and non-technical person is apparent, and should be adhered to. Be explicit and plain of speech, and go into details, if necessary, to an extent to make the hearer understand. Under only unusual conditions encourage the painting of the car or carriage by the layman. "Let the cobbler stick to his last," is a maxim that applies here, and if true, then why not the merchant to his business and the butcher and the baker to theirs and so on.

—1992—

Varnish for Automobiles.

The practice of thinning rubbing varnish has been condemned and justified in terms most emphatic, according to the viewpoint of the parties engaged in the controversy, but as a general proposition we think it has a greater weight of evidence against it than can be summoned to its aid. Special emergencies, or emergencies of the common sort, may dictate the policy of thinning the varnish in question, but apart from these events the practice should have no standing in the court of paint shop craftsmanship. The rubbing varnish, as it comes from the manufacturer, has a combination of elements which the maker of it has established at great expense and, when the painter undertakes to change the nature of the composition united in this very sensitive and complex material called varnish, he is making a venture similar to sailing the uncharted sea, with the same promise of disaster confronting him. It is, of course, understood that in the everyday circumstances of the shop, conditions will arise which seem to invite and sometimes compel an experiment not sanctioned by theory or approved practice, but all such occasions are the exception and not the rule. Only in extreme cases, and when all other plans fail to offer relief, would we assume the risk of thinning rubbing varnish, or for that matter any other kind or sort of varnish.

The writer does not say that it cannot be done, and done successfully, but he discourages the practice, as a practice for the sufficient reason that, while one is busy making the venture a success, a hundred other painstaking men are lamenting a dire failure of their efforts to improve on the product of the varnish maker. The right and logical method of using varnish, rubbing or finishing, is to follow the directions of the maker of the material. This practice is being followed more closely today than in times past, and it may be accepted as the one outstanding reason why varnish room failures have been reduced to the minimum, and why varnish makers are declaring that their "trouble men" are finding themselves, like Othello, without an occupation.

Just at this time it may chance that the painter is considering the advisability of getting his winter supply of varnish in ahead of the cold weather. This is always, in the Northern section of the country, at least, a wise provision. The season of frost and freezing is a bad time during which to have varnish in transit. Varnish is about the easiest thing in the world to get chilled past the workable state; and a night or two of extreme weather, with the zero mark flirting with the forecaster, is all sufficient to give the varnish a stubborn disposition and wreck the hopes of the finisher. Better, then, get the winter supply of varnish in early; or at any rate, ahead of the real winter weather. In the event of getting caught, as in the best regulated shops it sometimes happens, with a supply of chilled varnish, the reasonable way out of the difficulty is to place the lot in a situation affected by a gradually ascending thermometer, and thus, by easy stages, heat the varnish up to a normal degree, and eventually a trifle past that mark. Then continue to store the supply in warm quarters, and by delaying the employment of the material for some little time it will be found as a rule that it will work and shine forth with its perfectly normal character.

Varnish has a very human side to it, and only when this characteristic is respected, and in a measure catered to, may we expect to make it serve every purpose for which it is intended. The surface colder than itself need not be expected to receive it in the right manner; antagonism between it and the varnish is a natural result, concerning the outcome of which only a bad surface disorder need be predicted. Before using the contents of the varnish container it is well to always open the latter a half-hour prior to varnishing; this allows for the escape of the gases confined in the closed vessel and insures a smoother and finer working material. The temperature of the room in which the varnishing is to be performed needs also to be taken into account. As nearly as possible this room heat should correspond to the warmth of the

varnish, and to the condition of the surface. Indeed, the three chief factors involved in the process of varnishing must correspond very closely in point of temperature, and all should have a warmth approximating 75 degrees Fahrenheit. Along with these should come apartment conditions of a most satisfying sort—ventilation, light, cleanliness, uniform conditions, etc.

It is directly in line with safety first to strain all varnish before using. Even the finest finishing varnish may have some minor sediment lurking in its depths, which only the strainer will be able to catch prior to its appearance upon the surface. This is a practice which the best finishers never fail to observe. Varnish should be worked only to the extent of getting it in a correct position upon the surface. All varnish, rubbing and finishing, thrives best when disturbed the least. In other terms, after flowing it to its appointed place on the surface, cross brushing it just enough to insure uniformity of flowing to a certain depth of film, and catching up the edges, it may well be left severely alone. If it is of the right sort it will then take care of itself, and form to a body deep and rich and beautiful in proportion to its quality and royal substance. The varnish "tease"—the man who persists in working the very life out of the varnish through excessive use of the brush—is an expensive luxury about the varnish room. Better transfer his services to some other department of the shop where his opportunity for doing damage is less pronounced.

Again, varnish ought never to be turned out into service before it is fully fit—free from dust and hard enough to be unaffected by mud, dirt, and other active road or garage accumulations. Varnish, while really one of the finest protective mediums, and one of the hardiest substances, after a certain period of maturing upon the surface, known to the craft, is prior to its arrival at this stage an exceedingly sensitive material and quite likely, when encouraged, to perform some amazing changes.

Finishing varnish depends for its capacity for wear, and for enduring abuse and hard knocks, to no small extent upon the resources and stability of the rubbing varnish coats. These coats, then, may well be made the very bone and sinew of the entire varnish fabric—the chief cornerstone, if you will, of the finish. They need to have, first of all, a quality beyond reproach; second, they need to go to the surface in a full rich body; in point of fact, they must be so-called flowing coats, capable of drowning out all the minor atoms of fine dust and wisps of floating matter. They also need body and substance for rubbing uniformly throughout. And, as has been explained in these columns before, they should be allowed to carry as much of their original depth as may be possible consistent with the required measure of reduction through the process of rubbing.

In making choice of a varnish consideration should be given to the class of varnish likely to be best suited to the special requirements of the work. The car or carriage, for example, that is to go into service at a minimum period of time following the application of the finishing varnish may well carry a varnish suited, in the matter of drying qualities and general adaptability, to the special needs of the individual vehicle. Indeed, this phase of the matter should be given strict attention and choice of the varnish made accordingly. A highly elastic varnish for work that in the nature of the case must be handled quickly would be quite as much out of place as would a varnish of the fastest possible drying capacity upon the car given a leisurely schedule of progress through the paint shop. It, therefore, becomes a matter of serious importance when the question of choosing the class of varnish best suited to the needs of the work comes up for disposition. It is right at this point, in many cases, where the reputation of the painter is made or unmade, or becomes a negligible factor.

It often happens that a good job of finishing is ruined through attempting to remedy a surface defect after the varnish coats have been developed in fine order upon the car or carriage. This cannot be performed successfully once out of a hundred times of trying. The place to perfect all surface deficiencies is under the color coats; and at least under the varnish coats. Such work at once becomes an expensive experiment; never an assured process of skill.

Another feature of the surface building problem intimately related to the development of the varnish coats is that of making the under coats, including

the color coats, conform, in the measure of elasticity, as near as possible to that of the varnish coats, and especially to the finishing coat. A direct line of harmony should exist between the supporting foundation and the protecting varnish. In the effort now being made to give the work of painting the vehicle equipment greater durability and, if anything, more brilliancy, this study of creating a closer relationship between the under and the outer coats of the finished fabric—giving, in a word, a more complete chemical working basis to all the complex machinery of the various things combined in what is understood as the finish—grows into robust importance. The question of a more uniform elastic state of the mediums employed, in the light of recent data, becomes an immediately essential one.

The practice of mixing two or more grades of varnish of the same make, or two of more varnishes of different makes, in order to obtain a certain character or temperament specifically suited to meet the requirements of one's trade is more or less adhered to, even in this day of improved varnish making results. It is a practice, however, that has little to justify the painter in taking the chance of having the work come out looking decent under the glow of the hodge-podge concoction. No two varnishes, nor no two grades of the same make of varnish, have precisely the same disposition, or the same chemical composition, or the same tendencies to do the same thing and, for this reason, apart from numerous others, the custom of mixing varnishes is lacking in the essential element of certainty to recommend it. In this case it is a wise plan to let your varnish maker serve your various needs with a varnish fitted to them.

Advice may be consistently tendered the car or carriage user relative to the periodical revarnishing the vehicle. Excessive wear of the varnish is more costly, ultimately, than frequent varnishing which obviates the strain on the varnish fabric due to a lack of renewal of the finishing coat at the time it is most in need of additional protection. At a nominal expense the surface may be kept well nourished with an ample body of varnish, the simple requirement being a fresh coat, applied whenever the face of the finish shows a decline from its maturity. Let the vehicle owner know concerning this matter and, in a great majority of cases, he will prove quite willing to co-operate with you in getting another coat of varnish in place upon the surface. Both the vehicle owner and the painter may thereby profit through this campaign of co-operative vigilance. The varnish foundation worn threadbare before it is given additional treatment can never be fully restored to its former vigor; the best that can be done for it is to patch it up and give it an artificial stimulant, and reinforce its shattered arteries and impart to its sinews some of the old life. Then, too, it is well that the vehicle owner should know something of the necessity of giving the highly varnished surface storage quarters amply lighted, for light is the life of varnish, and at the same time it prevents the varnish from turning green or otherwise discoloring—preserves, in short, its original brilliancy, tone and quality. And with light should come the storage quarters devoid of moisture, save the normal amount, for anything above this is certain to work injury to the luster and durability of the varnish.

—1993—

Preserving Purity of Colors.

So far as possible the purity of color should be established upon the surface and maintained. So many fine colors are positively ruined through lack of proper handling and protection during their application to the surface. At a good deal of expense the surface is often brought up to receive the color; then, through inattention or lack of knowledge of the characteristics of the pigment, the purity of the tone and shade are ruined through the wrong use of varnish or through the too early application of the varnish following the laying of the color. It is unwise to varnish over a color before it has thoroughly dried; it is equally unwise to flow more than one coat of varnish over many of the delicate and sensitive colors. Varnish, for example, is simply destructive of the purity of tone of many of the

blues and many other pigments. That is, destructive when applied in a clear state to the colors. Used in the color in the form of varnish-color, the tone is preserved in its full brilliancy. All the colors which show a weakness in this respect should be handled in a way to insure their purity of tone and shade.

—1994—

Dry Wash and Cleaning.

Automobile painters are having their troubles with the cars which have been treated to the miraculous effects of the "dry wash" and "dry cleaners," and the various liquid polishes with which the markets have been flooded during the past few years. The great harm, perhaps the greatest, that is due to develop from use of concoctions above referred to—that, in fact has already developed—has its origin in applying the material onto the surface before washing it. Under this practice, all grit and dirt and foreign substances collected during road service are ground into the varnish to an extent hardly duplicated by rubbing with oil and pulverized pumice stone. Indeed the latter is, if anything, less harmful, because under the patent cleaners or dry washes the grit is often of a nature to dig viciously into the varnish to the extent of cutting through to the under coats. Even if this condition does not result, the scratches left in the surface gradually, as the wear on the varnish proceeds, grow into cracks and fissures which are removed only by carefully rubbing the surface down with water and pumice stone flour, and revarnishing. In the first place, if these polishes and dry cleaners are to be used at all—and we very much doubt their remedial effects prior to the third or fourth stages of varnish wear—the surface should be first cleaned with water, and when absolutely necessary, with water in combination with some mild detergent.

The explanation offered in extenuation of the dry cleaning and polishing practice often takes the claim that the coat of invisible substance lavished upon the finish keeps oxygen away from the varnish and thereby prevents its premature decay. The chemists of France, years ago, told us—and we believe science has since confirmed the conclusion—that oxygen promotes and lengthens the life of varnish, other conditions being favorable, for a reasonable term of wear; at most, it is only one of the mediums which, in due time, unite to finally deprive the finish of its capacity for protecting and beautifying the car.

The chief concern of the painter, in his attitude towards these patent so-called labor saving cleaners and polishes, is that when the car, smeared under the tenacious film of the tough and waxy stuff, comes to the paint shop to have a new dress of paint or color or varnish, he must invent some fairly quick method of getting it off the surface. One way is to rub the surface, after washing in the usual manner, with water and pumice stone flour, then cleaning off with alcohol or vinegar, and again rubbing with the water and pumice stone flour. The alcohol or the vinegar are said to catch up the vagrant traces of the cleaners and polishes, letting the water and pumice stone have a more perfect way of eliminating the foreign matter. However, in aggravated cases it is, on the whole, advisable to remove the entire body of varnish, either with varnish remover or with ammonia, and start on the color to bring up a new and supple body of varnish. In either way, it is a work of considerable extent and difficulty to fetch the base for the new finish out in perfect shape and to insure safety for the new finish on this base. If the varnish is to be removed with ammonia, the sixteen-degree material should be used.

—1995—

Baking the Finish.

Complaint has, of late, been heard concerning the quality of the finish applied at the various great automobile factories to the car chassis. It is claimed by the jobbing shop painters that the finish does not wear because of faulty application, or imperfect drying, or drying too quickly, etc. The finish, under present day

methods, is certainly quick, as they must be to meet the demands made upon the manufacturers. At the present time the chain assembly system conveyor is used in the painting of the chassis. By this system the chasses are advanced, after being assembled, from the first coat of paint to the finish, with all the coats baked on, the chain assembly system conveying the parts on a track through a baking oven of sufficient length to insure the paint or enamel being perfectly dry as it emerges from the other end of the oven.

In many shops there are several sections of ovens, between which are stationed men equipped with the proper apparatus who spray the chassis for its next drying in the oven following. In the Packard factory the first oven, in this conveyor system, which dries the ground coat, is 120 feet long. The second oven used for drying the varnish-color coats is 130 feet long, and in passing through this heat the coat is completely dried and rendered ready for the clear varnish. There are factories, equipped with the conveyor system, in which the priming coat, after application, this work consuming two and one-fourth minutes, is put through an oven 134 feet long in one and three-fourth hours, subjected to a temperature of 180 degrees. The chassis, still on the move, emerges from the first oven, and in a trifle over one-half hour travels between this first and second oven, meanwhile being sprayed with the coat of material to be dried in the second oven. In still other factories a single spraying and passage through one oven of even shorter length than those noted above suffices. It will be seen that, at most, the chasses are painted and finished, in some factories, in a comparatively few minutes with from one coat to three coats, the average, to be fair, being two coats.

This plan of finishing is not only altogether too brief, but lacks sufficient body to give strength and quality to the finish. In the end, the jobbing shop painter must pay the penalty—in fact, is already paying it. The chassis painting problem has many difficulties, chiefly on account of its basic treatment, which provides only a thin and impoverished film of material, baked at a high temperature at fast speed. To get these parts clean is the first concern of the painter, after which he had best scour the surface down to hardpan, in order to determine the actual first-hand conditions, and to make his method of painting fit the case. A good, substantial foundation, hard and intact, and free from fissures, is the first essential. Then, with the first coat, there may well be enough binder of pure raw linseed oil to tack the pigment fast for all time to the nether coat. Above this lay enough surfacing paint, in the case of good work, to insure, when properly surfaced, a fine and ample breadth and depth of material. Encase this in a body of varnish several coats deep, all rubbed and dried in good shape, and you will have a chassis finish which will stand up and defy the elements to the utmost. The intense vibration and oscillation to which these parts of the car are subjected requires a more thorough method of painting and finishing than has hitherto been accorded them. The really well painted and finished car cannot be had without giving greater attention to the chassis, both in the matter of painting, and of care taking when out in the thick of service.

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QUESTIONS AND ANSWERS.

Pertaining to the Best Practices in the Spray-Application of Paint and Like Materials.

Q. What is the thickness of the film of paint applied by the spray?

A. The spray can be regulated to apply the same amount as a brush coat, or more if necessary.

Q. What is the weight of spraying machine?

A. The spray itself weighs 15 ounces; the compressing outfit, mounted on a four-wheel truck, weighs approximately 1,200 lbs.

Q. How many gallons of paint does the paint container hold?

A. Containers range from 7 gallon to a 50 gallon capacity. Seven gallon pressure tank is the standard for master painters.

Q. What kind of materials are best suited for the spray?

A. Any kind of varnish, oil paint, water paint or enamel which can be brushed successfully can be sprayed.

Q. How far is the spray held from the work?

A. General average—8 to 10 inches.

Q. What is the mix of spraying paint?

A. Usually about the same as for brushing, sometimes 10 to 20 per cent. thinner.

Q. Can the spray be used outside on a windy day?

A. Yes, as the spray is held so close to the work, very little paint is blown away.

Q. How much air is necessary to atomize the paint?

A. Lead and oil from 40 to 50 lbs. Lighter materials require less air.

Q. What is the loss of paint with the spray compared with the brush?

A. None, if handled properly. A small amount is apparently wasted, but this is offset by the more uniform coating applied.

Q. What is the covering capacity with the spray?

A. Approximately 500 to 600 square feet, per hour, per man. On some kinds of work, considerably more.

Q. What height can paint be lifted to the spray?

A. Any distance up to 50 feet, from paint tank.

Q. Can small trim be painted and sash traced?

A. Not to good advantage.

Q. How are windows protected from the specks of paint flying through the air from the spray?

A. By placing light canvas or muslin in 7 or 8 foot lengths over the window. Lower the upper sash and raise the lower, place the canvas over the top sash, bring down and under the lower sash; then close both sashes. Closing the sash tightens up the canvas.

Q. Is there any saving of scaffolding with the use of the spray?

A. About 30 per cent. in most cases, and where extension pole is used, at least 50 per cent.

Q. Where is the spray used to the very best advantage?

A. Where there is a large amount of straight surface work. Also, on uneven surfaces, such as caps and "ginger-bread" work, which are hard to brush, and on all rough surfaces, such as concrete, brick, stucco, and shingle roofs.

Q. Does the paint clog the spray?

A. No, if material is properly strained into the tank, and sprayer cleaned after each job.

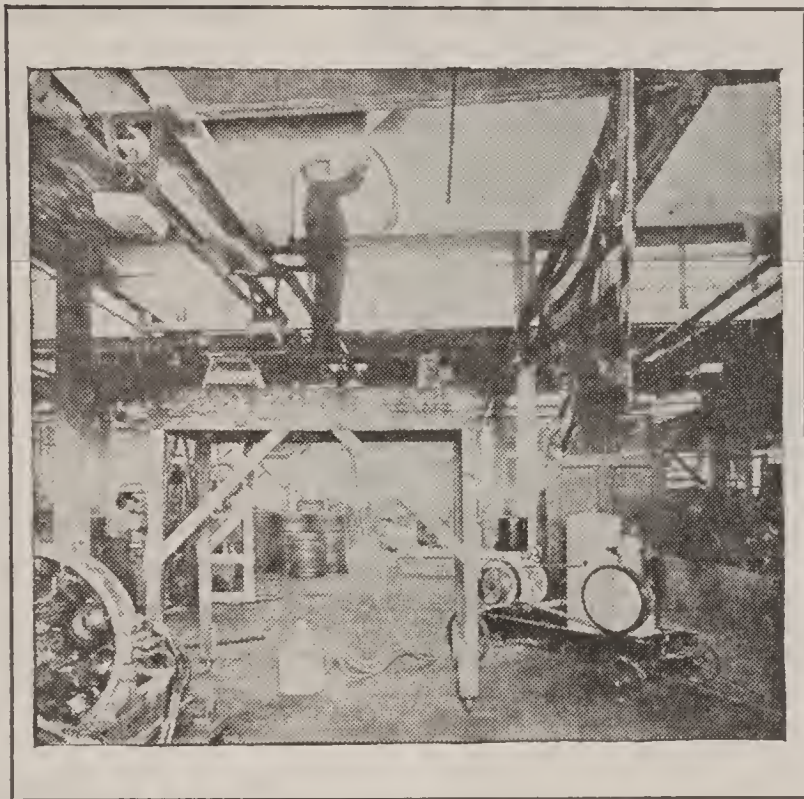
Q. What furnishes the power for the compressor?

A. Either a two or four H. P. gasoline engine, or electric motor, whichever is more suitable for the master painter.

Q. How are compressing outfits transported from one job to another?

A. The compressing outfit is small enough to be hauled in the ordinary automobile truck. Trailers are also furnished with compressing outfits installed in them.

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Follow these Specifications for your work and note the superior results.

OPEN GRAIN WOODS

to be filled with "Nice" Paste filler, rubbed off and allowed to dry, smooth off with fine sandpaper and then to receive one coat of "Nice" Liquid Filler. When dry smooth off with fine sandpaper or steel wool and finish with one coat of varnish.

CLOSE GRAIN WOODS

to receive two coats of "Nice" Liquid Filler and be finished with one coat of varnish. Allow each coat to dry and smooth off with fine sandpaper or steel wool before applying next coat.

For fine work the extra coat of "Nice" Filler followed with one coat of varnish will prove far superior to two coats of varnish without the extra coat of filler and be far more durable.

Send For Price List of "NICE" Fillers and Varnishes

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NEEOLYTE WHITE ENAMEL

A beautiful, durable, free flowing gloss white. Can be applied to the largest surfaces easily and without showing laps. Order Neeolyte for your next job and you will be as enthusiastic about it as we are.

NEEOSPAR VARNISH

A Pale, Elastic, Durable Spar. Good Body and Water Proof.

NEEO-KOTE Flat Wall Finish

A smoothy soft tone, velvety finish, without gloss. Durable, Sanitary, Washable. White and 16 colors.

Trokal Liquid Floor Finish

Two grades—"Superior Trokal" and "Extra Trokal." Both made to stand the severe wear to which floors are subjected, Waterproof. Will not mark white nor turn white.

Write for New Catalog and Prices of these and other "Nice" Paint and Varnish Products

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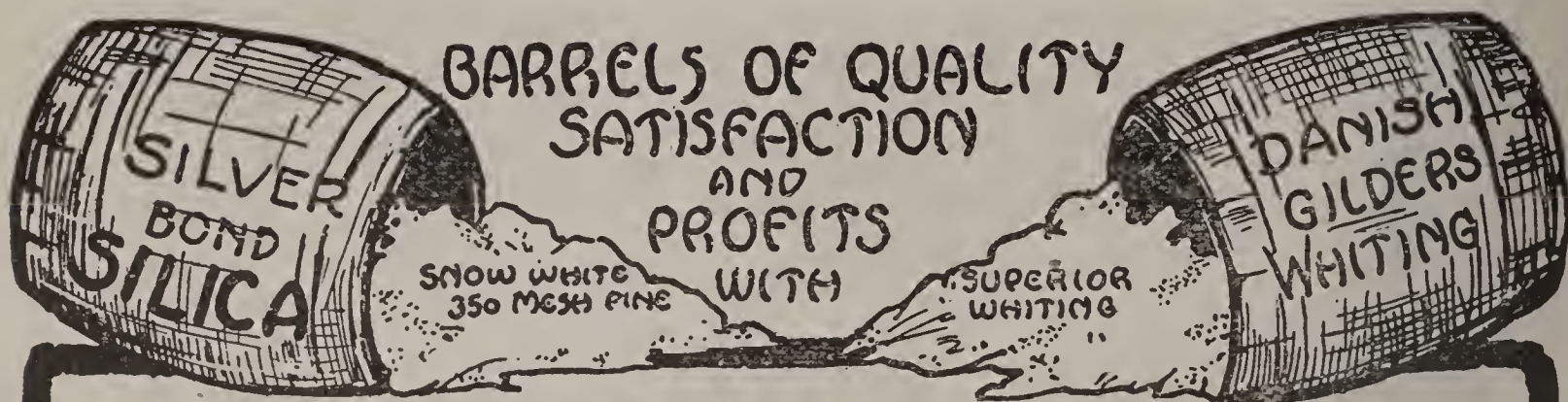
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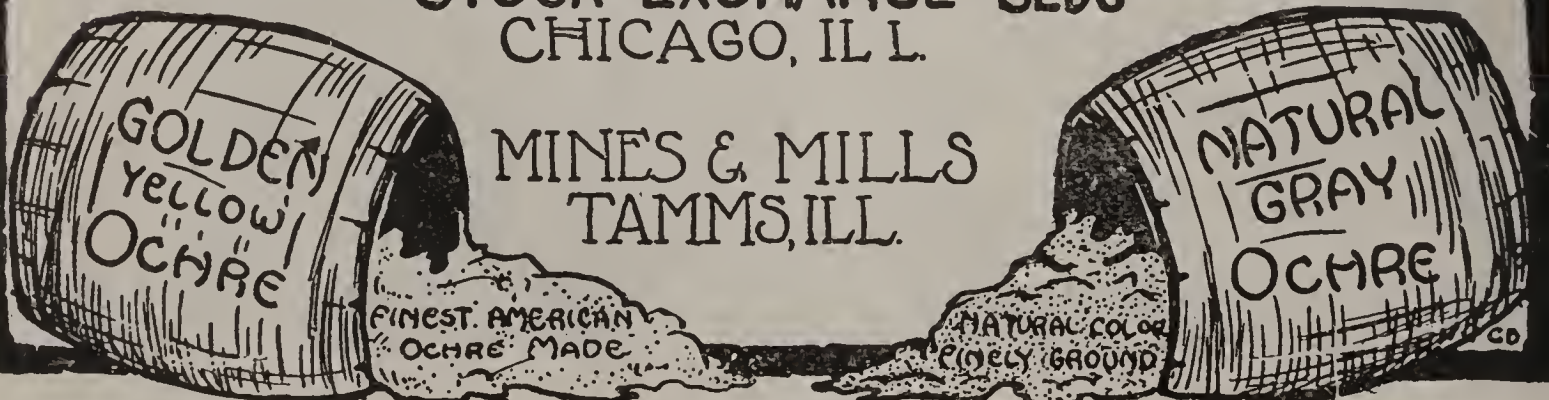
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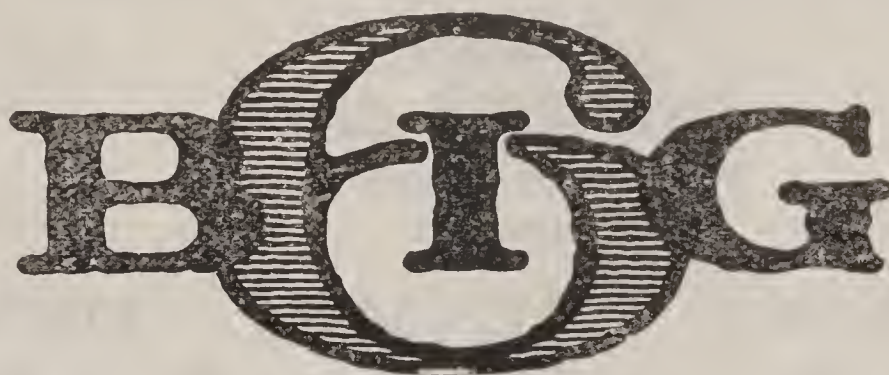
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